News Feeder

Technical Documentation

Michael Boge, Ian Mckay, Aron Hardy-Bardsley, Shiwei Zhang

Preamble

The following documentation outlines the technical information regarding the design and development of the News Feeder system. This information is intended for other developers and those interested in the technical properties of the system. This information is preliminary and subject to change.

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Vision

Introduction

News Feeder is a news feed aggregator service, which compiles content from multiple online content sources into a common news sheet format. It is intended for use by anyone in the general public that wishes to view regularly updating content in a simple manner.

Glossary

Item/Article – An individual piece of content. This includes articles from RSS feeds or items from other types of content sources (such as an email, forum thread, weather forecast, etc).

Feed – A collection of items/articles all related to the same content source (i.e. the same site or RSS feed).

Sheet – A grouping method for feeds. It displays feeds on the website as views the user has created.

Sheet Layout – The view used to display feeds and content associated with the sheet. An individual sheet may have many of these views. When referring to a sheet and the way it displays its content, we are implicitly referring to its default view.

Front-end – The web interface of the system, where users gain access to and interact with the system.

Back-end – An application which runs a continuous queue and crawls/parses content sources for articles to add to the database.

Problem Statement

The problem of	retrieving and viewing content from multiple online content sources that are updated regularly
affects	any member of the general public who wishes to stay up to date with all this information;
the impact of which is	as they have to visit each location for its relative content which is time consuming and it is easy to miss information, particularly for regularly updated content.
A successful solution would be	a service which crawls content sources specified by a user and retrieves content to display in a practical and suitable format. Meanwhile, requiring as little interaction/configuration from the user as possible to continue retrieving this content.

Position Statement

For	any members of the general public
who	wish to view regularly updated online content (such as RSS feeds) without needing to manually visit each content source.
News Feeder is a	online news aggregation service
that	compiles content from multiple online content sources into a common news sheet format.
Unlike	the alternative of accessing each content source for its relative news manually, and at regular intervals (to ensure no news is missed),
our product	automatically crawls the content source and retrieves new content as it becomes available, and displays it in an attractive, organised and customisable format. This ensures no content is missed and it is easily accessible for the user via an online interface.

System Overview

News Feeder is a news feed aggregation service, which compiles content from multiple online content sources. Its main purpose is to provide a single location and format to view news content instead of users having to access multiple websites for their specific news.

News Feeder allows users to specify which type of articles they wish to view, based on a number of criteria, including; location, category, author, publishing site and specific feed URLs.

The system crawls feeds which match the specified criteria and stores the relevant articles/items and their content. The articles/items can come from a number of different content sources (such as RSS, forums and social networks) and their content can be of any media type, including; text, images, video and geo-locational information.

The user can then view the stored articles and the article content on their sheets. The layout of the sheet will be in a standard news sheet format by default, but the system also provides a simple drag and drop interface for creating custom user layouts for sheets. Sheets will allow users to set filtering options to ensure certain types of content are not displayed to inappropriate audiences (such as pornographic material to minors).

Users can choose to subscribe to the News Feeder service for a monthly fee. This provides them with a number of benefits over standard users, such as access to the downloader application, customisable sheet layouts, increased feed/sheet limits and increased priority for content retrieval.

The system provides access for administrators to manage the News Feeder service. Administrators can manage users, feeds and items, as well as managing and monitoring back-end system processes (such as starting and stopping the crawler).

Access to this functionality is available via a web-interface. Users may also access News Feeder content offline via the use of a downloader application.

System Structure

The service's structure can be broken down into 6 main sub-systems:

The Database

This is where user, sheet, feed and item information is stored. It is used by both the front-end and back-end components and acts as a repository between the two.

The Front-End

This is the interface of the system. It consists of a number of web pages accessible by users and administrators. It provides the means by which the users and administrators interact with the system (including the back-end). This interface provides methods for users to manage and view feeds, as well as managing the layout used to display these feeds. The interface also provides methods for administrators to manage users, feeds and items, as well as allowing them to manage and monitor the back-end processes.

The Back-End

This is an application that is continuously running in the background. It provides the main processing of the system. Its main role is to crawl and parse feeds and content. To perform this role this component contains a continuous queue holding references to all feeds and ordered according to crawl priority. The parsers mainly operate on RSS and HTML items, but other content sources (such as weather feeds, forums and social networks) can also be parsed for storable content.

Additional non-essential components of the service are the API web service and the downloader application. The downloader application (and other possible applications) accesses the system by using the API web service as a gateway.

The Downloader Application

The downloader application is a client desktop application of which subscribed News Feeder users can download through the News Feeder website. The downloader application is not a primary subsystem; it is an extension of the News Feeder service and was built as an offline viewer alternative to the website.

The Web Service

The primary purpose of the web service API is to provide an internet facing gateway to allow downloader application to communicate with the internal subsystems of the News Feeder service.

The Shared Database Library

The Shared Database Library is a C++ library used by the Front-End, Back-End and web service sub-systems as a standard interface to access the News Feeder database. The library itself provides methods that can be called to access and modify the database entities and records via SQL statements. This library uses the MYSQL++ library to perform standard database tasks (such as executing a query) and instead focuses on generating application specific queries and retrieving the results.

This system was added to ensure all database calls within the system are performed in a standardised way and as such will achieve the same results. It was also added to separate the database connection/query generation from the other sub-systems.

As the library needs to be used by the different systems which are written in different programming languages (PHP for Front-End, C++ for Back-End, Java for the web service), the library provides a number of wrappers/interfaces for each specific version (these are generated by SWIG, Simplified Wrapper and Interface Generator).

Assumptions and Dependencies

The following assumptions and dependencies relate to the development and capabilities of the News Feeder service:

- The News Feeder system is intended to provide a service to the general public for use. It is not a product marketable to third-parties for implementation. This in turn adds the following assumptions:
    - The system will be internally based within one organisation, which uses the hardware and software required by each sub-system and module.

Each sub-system and module will have fast and secure communication methods will all other sub-systems and modules.

Users

There are 5 different classes of users who interact with the News Feeder service:

Standard User

The main end-users of the system, including anyone in the general public. They have registered with the service and can specify feeds they wish to view. They can set a number of user preferences and settings regarding what content they wish to display and how they wish to display it (such as content filters and sheet layouts). They are expected to have basic computer knowledge (sufficient for using a web browser).

Subscribed User

Standard users who have subscribed to the system for a fee. As such they gain additional benefits related to their use of the system, such as access to custom sheet layouts and access to the downloader application.

Administrator

Managers of the service. They manage a number of system features and components (such as user accounts and items) and are able to manage and monitor system processes (such as starting and stopping the crawlers). They are considered to have more in depth computer knowledge than a standard user and understand the internal workings of the system.

Guest

Anonymous users that can register to the service in order to become standard users. Guests can access the main page, FAQ and are also able to view links sent by registered users of the system (such as a link to an article).

Web Master

Owner of an external site that is being crawled. They access the system via a portal referenced in the crawler HTTP headers in order to specify how frequently they prefer their site to be crawled (or if they want it to be crawled at all).

User Environment

All users of the service will have access to an active ADSL internet connection in order to use the service, with the exception of the Downloader Application which will only require intermittent access to retrieve content.

The users will access the service using one of the following operating systems: Windows, Linux or Mac OSX. For online service access, users will be able to use: Internet Explorer 7+, Google Chrome, Mozilla Firefox or Safari. Standard web technologies will be used by the system to ensure future browsers will be able to access the system as well.

Scope & Limitations

This development of this service will focus on fulfilling the Base, High and Medium level requirements outlined in the Requirements section of this document.

In terms of limitations, it has a few mainly considering the online accessibility of the service for users and of the content sources:

- The ability for a content source to be crawled and parsed by the service will rely on how it displays its updates (e.g. via an RSS feed). If it does not provide these services or does not provide necessary information (such as a URL link to the article) it will not be able to be stored and used by the system.
- Information provided by the feed will be dependent on the information provided by the actual content source (e.g. we cannot show geo-location information if it is not provided in the article).
- The performance of the service for a user will be dependent on the network connection used to access it (we assume a standard ADSL network connection for the requirements defined in this document).

Constraints

The News Feeder project and its requirements are limited by the following constraint:

- **Network -** The performance of the service will be dependent on the network connection used to access it. The requirements defined in this document assume a standard ADSL network connection.

Cost and Pricing

The News Feeder system will be available for free to the general public. However, the system will also provide a paid subscription service, where a user will pay a small monthly fee to gain additional features of the service, such as:

- Removal of advertising from the site and sheets
- Access to the Downloader Application
- Increased limit on the number of sheets the user can create
- Ability to create custom sheet layouts

As the system is not being marketed as a product, there will be no additional charges (such as licencing) to potential vendors.

Quality Ranges

The following defined the quality ranges for the News Feeder service in terms of performance, usability and other factors:

- **Availability –** the service will be available 24 hours a day, 7 days a week, with the exception of small amounts of scheduled downtime for maintenance.
- **Usability –** the service will be easy to use for both the standard users, who are expected to have only small amounts of technical knowledge, and for the administrators, who are expected to have general knowledge of the system and its components.
- **Maintenance –** the system is able to be changed and/or configured without the need to reconstruct and redeploy the system.
- **Accessibility –** the service will provide help for the users, both in form of online help (and FAQ) and user and administrator manuals.

For additional quality ranges in terms of performance please see the Non-Functional requirements section of the Requirements document.

Precedence and Priority

The functionality discussed in this vision document should be available in the first release of the service to the public. Any additional features of lower priority will be added after the deployment over time (provided they can be integrated with the existing system causing minimal disturbances).

For details on the priority of the functionalities and the order they are to be implemented in is discussed in the Priorities section of the Requirements document.

Competitors and Alternatives

Aside from the alternative of manually retrieving online content from multiple sources, the system has to compete with a number of pre-existing online RSS aggregators. The following are the three most popular competitors, they all provide the same basic functionality, retrieving online content and compiling it in an easy to access location. These competitors and their main differences are:

Google Reader

This solution's main advantage is that it employs an interface common to other Google services (e.g. Gmail) with simple, easily understandable and powerful features. It provides a folders option to read and group subscriptions easily and also provides a simple method for sharing feed items, by email or directly via Google Reader itself. It can handle almost any type of feed and retrieves updated content quickly.

Bloglines

This solution differentiates itself from the others by providing the ability to support the publishing of any feed items (such as clippings or posts) to a personal blog. It allows for blogs to be created directly from this service, allowing both feed and blog management in the same interface. Bloglines does not provide the social media integration and tagging available the other competitors. Additionally this solution provides no OPML export functionality and updates its content the slowest out of these solutions.

Newsgator

This solution provides both a desktop client and web version, which sync together to retrieve updates and changes. It allows easy migrations to the service by allowing feed subscriptions to be imported using OPML. The disadvantages are that it does not allow feed reordering and the desktop client is Windows only.

Overall, these competitors all perform similar functions with some advantages and disadvantages. News Feeder is designed to implement as many of the successful features of these competitors as possible. The main area in which the News Feeder service differs from these competitors is the way the content is displayed. These competitors display the feeds in standard list/inbox type formats, whereas News Feeder will display them in fully customisable layouts, reminiscent of standard news sheets. Users will be able to design the layout format, as well as the formatting for the content (such as, are images displayed, how many items from that feed should be displayed).

Documentation Requirements

The following documents are required for the full system release:

- **Technical Documentation –** This describes the structure of the system and its development process, to enable future developers to make changes to the service.
- **Standard User Manual –** This is provided as a soft-copy from the service website and provides step-by-step processes for how a user can use the service (such as feed management, sheet management, registration, etc).
- **Administrator User Manual –** This provides step-by-step processes in regards to performing actions specific to administrators in the system (such as managing users and starting/stopping modules). It will be provided as both a hard and soft copy to the administrators of the system.
- **Downloader Application User Manual –** This provides step-by-step instructions for using the downloader application (in terms of downloading sheets, setting an update schedule, etc).
- **Online Help –** This is provided both explicitly, via a set of FAQ's accessible directly through the online service, and implicitly, via tool-tips, standard icons and a standard interface.

Requirements

Priorities

The priorities used in the requirements have the following meanings:

Base - Requirements that must be met before any high level requirements can be implemented. These will definitely be delivered.

High - Requirements which are necessary to fulfil the core functionality of the system. These will definitely be delivered.

Medium - Requirements that provide additional functionality for the service. We will attempt to deliver all of these requirements.

Low - Requirements that are the stretch goals for the project. These will only be implemented if time presents itself.

Requirements Summary

ID	Requirement	Priority
F1.1	Front-end Database Interaction	Base
F2.1	Login	Base
F2.2	Manage Users	Base
F3.1	Add Feeds	Base
F10.1	Back-end Database Interaction	Base

ID	Requirement	Priority
F2.3	Account Registration	High
F3.2	Search For Feeds To Add	High
F3.3	View Sheets	High
F3.4	Additional Media - Images	High
F4.1	Manage Sheets	High
F4.2	Manage Sheet Feeds	High
F5.1	Back-end Monitoring	High
F11.1	Crawl RSS Feeds	High
F11.2	Crawl Priority	High
F12.1	Parse RSS Feeds	High
F12.2	Advanced Parsing Techniques	High
F13.1	Logging	High
N1	Accessibility	High
N4	Performance (Front-end)	High
N5	Performance (Back-end)	High

N7	Stability (Back-end)	High
N8	Maintainability	High
N9	Sustainability	High

ID	**Requirement**	**Priority**
F2.4	User Profile/Settings Configuration	Medium
F2.5	User Subscriptions	Medium
F2.6	Subscription Management	Medium
F3.5	Printing Support	Medium
F3.6	Additional Media - Video	Medium
F3.7	Additional Media - Maps	Medium
F4.3	System Defined Sheet Layouts	Medium
F4.4	Custom Sheet Layouts	Medium
F5.2	Manage Back-end	Medium
F5.3	User Statistics	Medium
F5.4	Abuse Reporting	Medium
F6.1	Content Filtering	Medium
F6.2	Content Blacklisting	Medium
F6.3	Bad Word Censoring	Medium
F7.1	Web Security	Medium
F8.1	Downloader Application	Medium
F9.1	Recommended Feeds	Medium
F9.2	User Sheet Update Notifications	Medium
F9.3	Mobile Support	Medium
F12.3	Retrieve Additional Media	Medium
F12.5	Tag/Keywords Generation (Categories)	Medium
F12.7	Multiple Content Sources	Medium
F14.1	Email Notifications	Medium
F15.2	API Web Service	Medium
N2	Ease of Use (User)	Medium
N3	Look and Feel (Aesthetics)	Medium
N6	Portability (downloader application)	Medium
N10	Help	Medium
N11	Scalability	Medium

ID	**Requirement**	**Priority**
F8.2	Mobile Application(s)	Low
F9.4	Social Network Authentication	Low
F12.4	Geo-location Retrieval	Low
F12.6	RSS and HTML Parsing Configurations	Low
F13.2	Auditing	Low
F14.2	SMS Messaging	Low
F15.1	Image Storage (Thumbnails)	Low
F15.3	Learning Algorithms	Low

Functional Requirements

Front-end

F1 – Database Interaction

ID: F1.1	**Requirement:** Front-end Database Interaction	**Priority:** Base
Description: The front-end is able to retrieve and store information about feeds, users and sheets in a database.		

F2 - User Management/Login System

ID: F2.1	**Requirement:** Login	**Priority:** Base
Description: The system will provide users and administrators with the ability to login to the system via the website by providing a username and password. After logging in, users are to be able to access account specific information (such as their feeds and sheets) and functionality.		

ID: F2.2	**Requirement:** Manage Users	**Priority:** Base
Description: The system will allow administrators to add/remove/edit users from the system for administrative purposes (such as removing users who have been inactive for too long). The editing ability also includes resetting user passwords/password attempts.		

ID: F2.3	**Requirement:** Account Registration	**Priority:** High
Description: The system will enable guests to register an account by providing an email address, username, appropriate password and other relevant user information. All account information will be validated on registration, such as checking for unique usernames.		

ID: F2.4	**Requirement:** User Profile/Settings Configuration	**Priority:** Medium
Description: Using the web interface, users will be able to modify their profile information (email address, name, avatar image, etc) and personal settings, such as how much priority they put on a particular feed, how often they wish to receive notifications.		

ID: F2.5	**Requirement:** User Subscriptions	**Priority:** Medium
Description: The system will allow users to subscribe/unsubscribe to the news feeder service to gain additional benefits such as access to the downloader application, customisable sheet layouts, increased Feed/Sheet limits and increased priority for content retrieval. Subscriptions will be recurring on a monthly basis for a fee.		

ID: F2.6	**Requirement:** Subscription Management	**Priority:** Medium
Description: The system will allow administrators to create/edit/delete/review user subscriptions via the web interface.		

F3- Feed Management

ID: F3.1	**Requirement:** Add Feeds	**Priority:** Base
Description: The system will provide users with the ability to add feeds to their sheets. The feeds to add can be newly created, pre-existing user feeds or default feeds.		

ID: F3.2	**Requirement:** Search For Feeds To Add	**Priority:** High
Description: The system will provide the users with the ability to search for feeds either currently in the database or from the internet (using a search API) matching specified search criteria (such as keywords, author and location). The resulting feed(s) can then be added to the user's sheet(s).		

ID: F3.3	**Requirement:** View Sheets	**Priority:** High
Description: The website will display sheet content in a suitable web format for the user to read.		

ID: F3.4	**Requirement:** Additional Media - Images	**Priority:** High
Description: The front-end is able to display image content that was included in the original item in standard HTML format.		

ID: F3.5	**Requirement:** Printing Support	**Priority:** Medium
Description: The system will provide users with the ability to print off their sheets and individual feed items in a readable format similar to that of the site.		

ID: F3.6	**Requirement:** Additional Media - Video	**Priority:** Medium
Description: The front-end is able to display video content that was included in the original item in standard HTML format.		

ID: F3.7	**Requirement:** Additional Media - Maps	**Priority:** Medium
Description: The front-end is able to display geo-locational content that was included in the original item. The content will be displayed using the relevant map API.		

F4 - Sheet Management

ID: F4.1	**Requirement:** Manage Sheets	**Priority:** High
Description: The system provides users with the ability to create sheets which contain a number of different feeds. Users will be able to set the sheet layout from a predetermined list (1 column, 2 column, and 3 column layout). Users will be able to delete their sheets.		

ID: F4.2	**Requirement:** Manage Sheet Feeds	**Priority:** High
Description: The system will allow users to add and remove feeds from their sheets. The will also be able to edit a feed's information in relation to how it is displayed on the sheet, such as what content (title, description, body, images) of the feed will display or how many items to show from that feed.		

ID: F4.3	**Requirement:** System Defined Sheet Layouts	**Priority:** Medium
Description: The system will provide a set of pre-defined layouts which the user will have access to when creating sheets and sheet views.		

ID: F4.4	**Requirement:** Custom Sheet Layouts	**Priority:** Medium
Description: The system will enable users to create their own custom sheet layouts via a drag and drop interface. Users will then be able to drag and drop feeds of their choice into the layout.		

F5 - Administration

ID: F5.1	**Requirement:** Back-end Monitoring	**Priority:** High
Description: The front-end web interface allows administrators to retrieve statistics on the back-end (such as crawler, thread and database statistics). Administrators will also be able to monitor the current back-end load.		

ID: F5.2	**Requirement:** Manage Back-end	**Priority:** Medium
Description: From the front-end web interface, administrators will be able to start and stop crawling as needed. Administrators will also be able to change the back-end configuration information such as the number of threads available to each part of the back-end system.		

ID: F5.3	**Requirement:** User Statistics	**Priority:** Medium
Description: The system will display basic user statistics (such as how many users, how many user feeds, etc) on the home page of the website.		

ID: F5.4	**Requirement:** Abuse Reporting	**Priority:** Medium
Description: The system will allow webmasters of content sources to adjust the frequency that the system crawls their sites (including the ability to disable all crawling), to ensure it does not exhaust their resources. This is done via a portal referenced in the crawler HTTP headers.		

F6 - Content Filtering

ID: F6.1	**Requirement:** Content Filtering	**Priority:** Medium
Description: The system will allow users to specify categories/keywords which they do not want displayed in their sheets. This can be used to filter out inappropriate material (such as pornography).		

ID: F6.2	**Requirement:** Content Blacklisting	**Priority:** Medium
Description: The system will enable administrators will be able to add specific sites/content sources to a blacklist that the system will ignore.		

ID: F6.3	**Requirement:** Bad Word Censoring	**Priority:** Medium
Description: Offensive words (listed in the database) will be censored in content displayed to the user. This will be a user preference.		

F7 - Security

ID: F7.1	**Requirement:** Web Security	**Priority:** Medium
Description: The front-end will use SSL for secure communications when communicating important information with the user (such as logins). This will be a user preference.		

F8 - Additional Applications

ID: F8.1	**Requirement:** Downloader Application	**Priority:** Medium
Description: The service will provide subscribed users with access to a downloader application. This application will provide a method for viewing sheets offline, either by providing PDFs or an offline version of the content.		

ID: F8.2	**Requirement:** Mobile Application(s)	**Priority:** Low
Description: Specific applications will be developed for mobile devices to provide access to and use the system.		

F9 - Miscellaneous

ID: F9.1	**Requirement:** Recommended Feeds	**Priority:** Medium
Description: The system will be able to suggest relevant feeds the user may be interested in. This will be based on the feeds the current user is and has been subscribed to, and any relations between these feeds (such as keywords, author, location, source, etc).		

ID: F9.2	**Requirement:** User Sheet Update Notifications	**Priority:** Medium
Description: The website will display the number of new items available in a content area on a sheet for each user. The number of sheets which have new content available will be displayed in the global menu area.		

ID: F9.3	**Requirement:** Mobile Support	**Priority:** Medium
Description: The web site will support mobile access. All pages and content will be able to be viewed on mobile devices (without issues and in the correct format, including sheet layout).		

ID: F9.4	**Requirement:** Social Network Authentication	**Priority:** Low
Description: The front-end will integrate with social network authentication providers (such as Facebook, Twitter) to provide access via users' respective logons.		

Back-end

F10 – Database Interaction

ID: F10.1	**Requirement:** Back-end Database Interaction	**Priority:** Base
Description: The back-end is able to retrieve and store information about feeds and crawled/parsed content in a database.		

F11 - Crawling

ID: F11.1	**Requirement:** Crawl RSS Feeds	**Priority:** High
Description: Given an RSS feed, the back-end will crawl it and retrieve items for parsing into content. It will continue to crawl the feed for new content on a regular basis.		

ID: F11.2	**Requirement:** Crawl Priority	**Priority:** High
Description: Based on a number of feed statistics the crawler will dynamically arrange the feeds so that feeds of higher priority are crawled more regularly than others. The priority will be based on properties such as; the average amount of time between content updates, the number of subscribers and feed type (new, user defined, system defined, etc).		

F12 - Parsing

ID: F12.1	**Requirement:** Parse RSS Feeds	**Priority:** High
Description: Given RSS XML input the back-end will extract information (such as feed title, author and content).		

ID: F12.2	**Requirement:** Advanced Parsing Techniques	**Priority:** High
Description: If an article's full content is not provided in the RSS feed, the back-end is able to apply techniques which will retrieve the full article content.		

ID: F12.3	**Requirement:** Retrieve Additional Media	**Priority:** Medium
Description: The back-end is able to retrieve non-text elements (such as images and videos) that are related to the article by parsing the actual HTML page it is displayed on.		

ID: F12.4	**Requirement:** Geo-location Retrieval	**Priority:** Low
Description: Given an article the parser will attempt to determine locations relevant to the item (this will work by using any available Maps API references in the RSS, or by looking for place names in the body).		

ID: F12.5	**Requirement:** Tag/Keywords Generation (Categories)	**Priority:** Medium
Description: The parser will be able to retrieve/generate tags/keywords for an item, to assist in the searching of items. These will be generated using the attributes, such as the description, if not directly available in the RSS feed.		

ID: F12.6	**Requirement:** RSS and HTML Parsing Configurations	**Priority:** Low
Description: The system will allow administrators to configure the back-end to parse items differently based on heuristics within the RSS/HTML (e.g. meta-tags identifying creation with WordPress) using configuration files.		

ID: F12.7	**Requirement:** Multiple Content Sources	**Priority:** Medium
Description: The back-end will be able to crawl and parse content from sources other than RSS (such as weather, email, social networks, forums, etc).		

F13 - Logging

ID: F13.1	**Requirement:** Logging	**Priority:** High
Description: The back-end will provide error logging and optional verbose logging. These will be output to log files which are accessible on the back-end server.		

ID: F13.2	**Requirement:** Auditing	**Priority:** Low
Description: The system will provide logs of users' interactions with the system in the form of audit trace logs.		

F14 - Notifications

ID: F14.1	**Requirement:** Email Notifications	**Priority:** Medium
Description: Email notifications may be sent when new content is found for a user's sheet. Alternatively, it may be configured to send 'batch emails' which consist of all updates over a period of time.		

ID: F14.2	**Requirement:** SMS Messaging	**Priority:** Low
Description: The system will provide update notifications to users when new content becomes available via SMS messaging.		

F15 - Miscellaneous

ID: F15.1	**Requirement:** Image Storage (Thumbnails)	**Priority:** Low
Description: Images will be resized and stored in the database to reduce bandwidth usage in the user's browser, prevent linking to missing images and also prevent possible HTTPS issues.		

ID: F15.2	**Requirement:** API Web Service	**Priority:** Medium
Description: The system will provide an interface for the downloader application and potentially, other 3rd party applications. Its purpose is to act as a gateway for external systems to access content.		

ID: F15.3	**Requirement:** Learning Algorithms	**Priority:** Low
Description: The system will be able to gradually learn the best method for parsing particular content sources. This will be based on what the system has learnt and parsing configurations from administrators.		

Non-Functional Requirements

ID: N1	**Requirement:** Accessibility	**Priority:** High
Description: The system will be accessible via any modern browser (Chrome, Firefox, Safari, IE7+) on any modern Operating System (Windows, Linux, Mac).		

ID: N2	**Requirement:** Ease of Use (User)	**Priority:** Medium
Description: Users will be able to learn to use the features of the system within a short time period (e.g.10 mins), without any help/training external to the site.		

ID: N3	**Requirement:** Look and Feel (Aesthetics)	**Priority:** Medium
Description: The front-end interface should be intuitive, consistent and familiar to users, such that they can easily navigate and use the site.		

ID: N4	**Requirement:** Performance (Front-end)*	**Priority:** High
Description: The front-end sub-system will adhere to the following performance metrics: • Page Load – All pages should load (excluding media, such as images, video, maps) in under 2 seconds. • Searching for News Feeds – First results should be returned within 5 seconds. • Crawling Feeds – First results should be available within 1 minute.		

ID: N5	**Requirement:** Performance (Back-end)	**Priority:** High
Description: The back-end sub-system will adhere to the following performance metrics: • Responding to Front-end – Calls will on average take 1 second to respond. • Crawling and Parsing a Feed Item – Crawling for a feed item (including media, patch and match) will be completed within 5 seconds. • Queuing – One queue item will not be in the queue longer than its expected update time without being crawled.		

ID: N6	**Requirement:** Portability (downloader application)	**Priority:** Medium
Description: The downloader application will be available on all modern platforms (Windows, Linux, Mac OSX)		

ID: N7	**Requirement:** Stability (Back-end)	**Priority:** High
Description: The back-end is able to handle invalid inputs and malicious SQL without error. Any errors which occur will be handled cleanly, as will service stops and restarts.		

ID: N8	**Requirement:** Maintainability	**Priority:** High
Description: The source code of all subsystems will conform to code styling standards and implement good design principles, which will allow for future upgrades and maintenance without requiring a system overhaul.		

ID: N9	**Requirement:** Sustainability	**Priority:** High
Description: The system will have mechanisms in place to maintain itself without the need for external interaction (e.g. the system will clear the logs automatically after a set period/size limit).		

ID: N10	**Requirement:** Help	**Priority:** Medium
Description: The site provides help and FAQ for the user, both directly (i.e. showing a help page and tutorial) and indirectly (i.e. descriptions like tooltips).		

ID: N11	**Requirement:** Scalability	**Priority:** Medium
Description: There can be an unlimited number of users, sheets, feeds and items. The system will be able to cope with increased numbers without requiring changes to the internal subsystem (i.e. changes that require re-compiling/deployment).		

***** *Please note that these performance requirements exclude possible network limitations*

Operational Requirements

To install the News Feeder Downloader application you must meet the following requirements:

- Web Browser (for initial download)
- Runs on Microsoft Windows 2000 or greater
- Runs on Linux 2.6.x kernel
- Runs on Mac OS X
- Support for 32-bit and 64-bit systems
- Working network connection
- Printer (if printing)

To use the News Feeder web service you must meet the following requirements:

- Web Browser
- Screen resolution of 420x380 or greater
- Working network connection
- Printer (if printing)

Technologies

Software Technologies

PHP: PHP is an open source web technology which is used for server side processing in a web environment. PHP is the primary language used in the News Feeder website and is used to retrieve and display data to the user as well as persist data to the News Feeder database. PHP was chosen as the primary language as it is well documented, stable and provides the functionality needed by the News Feeder. This functionality includes (but is not limited to):

- Network Sockets Support
- MySQL Support
- Session/Cookie support

Technology Reference: http://php.net/

C++: C++ has been used to develop the News Feeder Back-End crawler. The crawler required a language that supports abstract functionality like classes, templates and threading. The Back-End does not need to be cross platform as it will sit on a server with a controlled environment. All members of the team are fluent in C++.

Technology Reference: http://cplusplus.com/

Java: Java is the language used to develop the News Feeder Downloader Application which allows a user to download content and then view it while offline. Java is used because it is cross-platform and so the Downloader Application is not limited to a single audience.

Technology Reference: http://java.com/

OPML: OPML is an XML mark-up used with both the News Feeder service and other related services to store information about a collection of RSS/ATOM feeds.

SQL: SQL (Structured Query Language) is used to communicate to the database server (MYSQL). SQL is used by both the Front-End and Back-End.

HTML/JavaScript: The HTML and JavaScript scripting languages are used to render content on the users browser. HTML version 4.0.1 is used, it was decided that HTML 5 was not to be used as it lacks support. JavaScript is used to enhance the users experience by enabling dynamic content to be rendered on the page. Dynamic features of the Front-End Website include:

- Drag and Drop functionality
- Ajax powered searches and content loading
- Dynamic client side form validation

Hardware Specifications

Front-End Host

Host: VMPort
Location: Kansas City, US
Virtualization Type: OpenVZ
RAM: 1GB
Disk: 60GB
Bandwith: 600GB
Monthly Price: 4.42 GBP (~$7 AUD)

Back-End Host

Host: BuyVM
Location: San Jose, USA
Virtualization Type: OpenVZ
RAM: 1GB (2GB Burst)
Disk: 60GB
Bandwith: 3TB
Monthly Price: $12.95 US (~$13 AUD)

Database Host

Host: JustHost.com
Location: Chicago, US
Virtualization Type: Standard Web Host
Disk: Unlimited (subject to TOS)
Bandwidth: Unlimited (subject to TOS)
Monthly Price: $2.95 AUD

Development Tools

The following tools were used during the development of the News Feeder system:

- Subversion repository from Assembla
- phpMyAdmin
- FileZilla FTP Client
- NetBeans IDE
- PuTTY
- Notepad++
- Xcode 4
- IntelliJ IDEA

Development Iterations

The News Feeder service is to be developed using a combination of the throw-away prototype and iterative development models.

Initially the system will be developed as a throw-away prototype where each sub-system and its features are implemented. This enables development to start early so all concepts and technologies can be tested for feasibility (for example, testing SWIG is viable before designing the Shared Database Library). The prototyping phases will each focus on adding particular functionality, namely:

- Phase 1 (Prototype) – In this phase each sub-system (most importantly the front-end and back-end) will be developed separately and not integrated. Its focuses are:
  - RSS feed parsing
  - Crawling for RSS feeds
  - Site login
  - Sheet management
  - Database connections (to all sub-systems)
- Phase 2 (Prototype) – At the end of this phase (after each sub-system has been developed it will be integrated). Its focuses are:
  - Queue management
  - Threading
  - Administration Service
  - Layouts
  - Viability of SWIG (and the Shared Database Library)

After these initial prototyping phases, we will have determined what sections are feasible so we will finalise our requirements. The prototype will be discarded and the development will start from the finalised design details. The development process will now follow the standard pattern of implementing functional requirements of progressively lower priority with each iteration. The iterations will implement the following functionality:

1. Base level requirements
2. High level requirements
3. Medium level requirements
4. Low level requirements (this iteration is non-essential, it will only be performed if there is available time).

Test Planning

Throughout the development process the system and its sub-systems will be tested. During development, each sub-system will be individually tested. Each sub-system will have standard white-box and black-box testing performed on it. In addition to these, each sub-system will have its own specific test cases and methods (based on the sub-system type and technologies used):

- **Front-End –** The front-end will focus on black-box testing and usability testing. It will use Selenium to perform the black-box testing and its usability test cases will focus on possible user input and errors. The front-end will also be load and performance tested, to ensure it meets the performance and response requirements.
- **Back-End –** The back-end's testing will focus on unit testing using CPP-Unit and by code-coverage tests. Each individual module (such as the crawler, the parser or the queue) will be individually unit tested before it is integrated with the other modules. Load and stress tests will be performed on specific modules, notably the crawler and queue (due to the large number of items that will be involved in production use).
- **Web-Service –** The web service will be load tested, to ensure it can cope with the number of requests coming from the downloader application.
- **Downloader Application –** The downloader application itself will be unit tested via J-Unit. Usability testing will also be performed in regards to the user interactions with the application.
- **Shared Database Library –** The database library will be white-box tested to ensure its performance is satisfactory. It will also be load tested considerably, as it has to handle a large number of requests from all other sub-systems.

As each sub-system is further developed and new versions are created (both minor and major), it will be regression tested to confirm previous functionality is not lost as more is added.

When major versions of the sub-systems are completed (such as at the end of the iteration cycles), they will be integrated into the service as a whole. As these parts are added/updated, integration testing will be performed on the whole service. Additional sub-systems will not be added until the current system has passed its current integration tests.

System Architecture

Repository Design

The News Feeder system is designed using the repository architecture. With all data being stored in a central database (with the shared database library acting as an interface into it) and all subsystems and modules being used to retrieve, add or modify data in the database.

The main reason this decision was made was because all sub-systems use the same shared data (i.e. the feed and item information). The use of the repository architecture means that there is no need to duplicate the storage of this data and also that any modifications made by one sub-system will propagate up to all other sub-systems (this is particularly important when the backend updates feed information, as the front-end wishes to show as up to date information as possible).

This architecture was also chosen as it supports support our development method, with the breaking up of the system into sub-systems. This means that during development changes can be made to any one sub-system without affecting the development of the others. This is also true in terms of maintenance upon release, as it reduces the amount of downtime for the system (as only the sub-system in question would have to be taken down).

The service also uses the 3-tier architecture to a degree, with the 3 sections:

- **Client** – The UI interface in the web-browser and applications the user will interact directly with on their home machine.
- **Servers** – The servers running within the service architecture that will perform all of the logic of the service.
- **Database** – Where all content is stored, the servers interface into this using the shared database library.

Sub System Architecture

The service's structure can be broken down into 6 main sub-systems:

The Database

This is where user, sheet, feed and item information is stored. It is used by all other modules, where access is provided using the shared database library.

The Front-End

This is the interface of the system. It consists of a number of web pages accessible by users and administrators. It provides the means by which the users and administrators interact with the system (including the back-end). This interface provides methods for users to manage and view feeds, as well as managing the layout used to display these feeds. The interface also provides methods for administrators to manage users, feeds and items, as well as allowing them to manage and monitor the back-end processes.

The Front-End is developed using the Model View Controller pattern in order to use a standardized way of accessing data and integrate with other systems such as the Shared Database Library.

The Back-End

The Back-End does not use conventional design patterns, instead it uses a pattern named the "independent module pattern".

Independent Module Pattern

Unlike the traditional module pattern, a module is not a Singleton but a class inherited from a module prototype which consists of common components and interfaces. All modules are managed by a master class and can be dynamically loaded or unloaded as required, so they can run in their own threads.

This pattern provides the following advantages:

1. It allows for multiple instances of a module to exist at any one time.
2. It allows for efficient data sharing between modules.
3. Running the modules in threads is less performance heavy (particularly in memory).
4. Modules can be easily managed (such as started and stopped)

This pattern has one disadvantage, namely if a module incurs a fatal error, causing that process to crash, all modules are affected.

The Downloader Application

Dependencies

The downloader application directly depends on the web service API. All communication between the downloader application and other News Feeder subsystems is channelled through the Web Service API.

There are no subsystems which depend on the downloader application.

Portability

To allow for the largest audience possible, the downloader application is written in Java. Java provides a platform independent approach and will allow the downloader application to be used on Windows, Linux, Mac and many more platforms.

Data Architecture

As previously stated, the downloader application is available for offline use. This requirement implies the use of a secondary offline data source. A secondary data source which will be stored on the client's machine will only hold the information it requires to display the content to the user based on their view. It will provide a mechanism to clean the data and maintain it by downloading the most up to date data from the Web Service API.

Application Design

The primary design pattern used in the design and development of the downloader application is the Model View Controller pattern. The application will also have a background process which will run while the process sits in the task tray. The background process will perform data maintenance tasks on the secondary data source and

The Web Service

Dependencies

The web service API directly depends on the News Feeder Shared Database subsystem. The web service API does not directly communicate with any other subsystems.

The only subsystem which depends on the web service API is the downloader application. Without the web service, the downloader application would be useless.

It is also important to mention here that the web service may be released to a public audience, allowing third party developers to leverage the News Feeder Service. Any third party applications developed which leverage the News Feeder Service would then depend on the web service API.

Web Service Abstraction Layer

The creation of the web service itself was an architectural decision made primarily to prevent direct database connectivity from the downloader application. However, having a web service also has other advantages to the overall architecture of the system including:

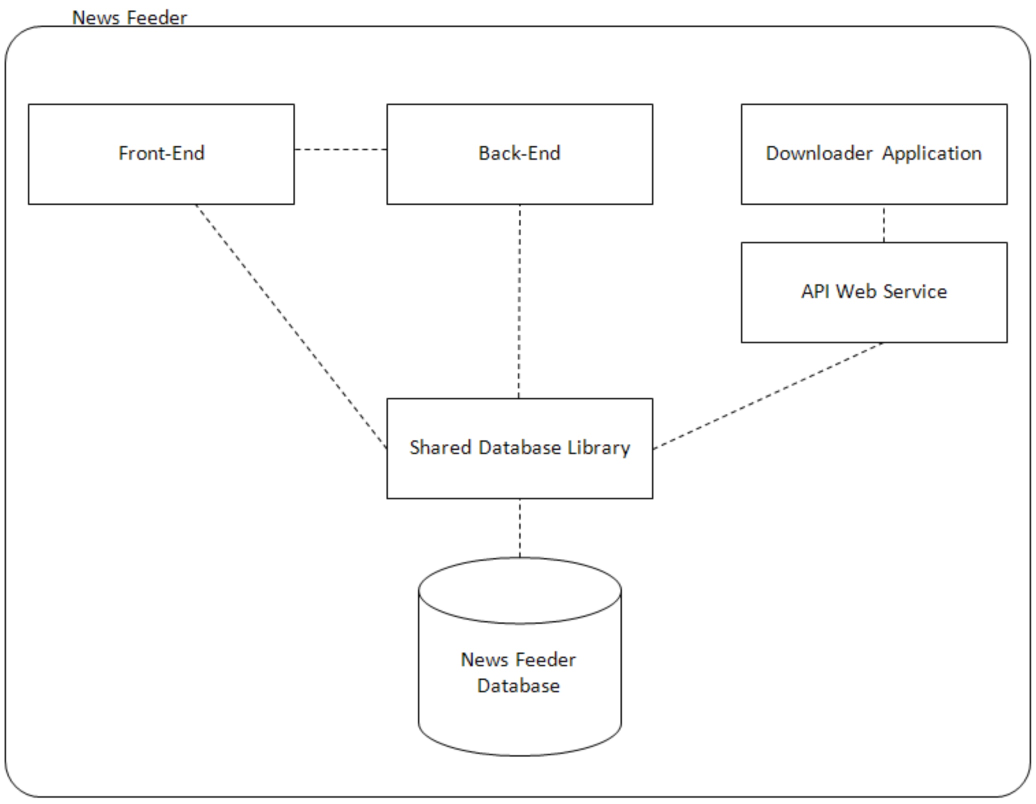
- Enhanced security - Preventing external direct access to the database server will prevent attacks on the database
- Enhanced Control – Only allow the downloader application and other third party applications to execute a controlled set of queries/commands. If the downloader application was discontinued, or a security breach was detected, the web service could be shut down without affecting the core service.
- Public API – The web service may allow third party application developers to leverage the News Feeder Service.
- Load balancing / separation / scalability – If the system is required to be expanded the URL used for the web service can be load balanced to multiple servers to handle external requests, those servers can then utilize their own database cluster separate to the front end.

The Shared Database Library

The Shared Database Library is designed using the Model View Controller pattern. Where the models are classes representing of the database records that are to be altered/retrieved and the controllers are the classes called in order to modify these models. The views in relation to this library are the other sub-systems which access it (namely the front-end, back-end and API web service) as they are using the library to retrieve the information from the models for use.

The Model View Controller pattern was chosen because the shared database library is designed to act as a standardised interface used by the other sub-systems. As such, each sub-system will view and interact with the data in different ways. This pattern enables the other sub-systems (acting as views) to interact with the database simply by using the library's associated controller classes and then processing the returned information as needed. The additional advantage of choosing this pattern is that any major changes regarding database access/interaction (such as changing to another database type or changing the schema) means the changes only have to be made once, in this library, rather than on all of the other subsystems.

The shared database library also makes use of the Singleton pattern in regards to the DatabaseController class. It uses the singleton here to prevent to prevent the system from opening too many connections to the database. Instead, the library will retrieve connections from the DatabaseController connection pool.



System Interaction

Sub-systems and the Database

The front-end, back-end and web service all need to communicate to the database in order to store and retrieve information. This access is provided via the shared database library, which acts as an interface for the interactions between these sub-systems and the database.

The sub-systems instantiate controller objects from the library and call methods relating to retrieving or storing the entity types associated with each controller. The controller classes then construct SQL queries based on the inputs from the sub-systems.

The shared database library will then attempt to execute these queries on the database, by using connections and methods provided by the MySQL++ library. The results from these queries will be returned to the shared database library, which will then transform them into suitable responses (i.e. a basic response or entities to return) which will be sent back to the sub-system.

Downloader Application to API Web Service

The downloader application communicates to the API web service to obtain information from the News Feeder database. The API web service can be seen as a gateway to the internal systems from the internet, the API web service provides a limited set of functionality targeted at what the downloader application requires.

The downloader application is required to authentication before retrieving any information from the API web service by providing a username and password of a subscribed user who has access to the downloader application functionality.

In the future, if the API web service is released to the public, the security and functional implementation details may be changed.

Front-End to Back-End

A communication link between the Front-End and Back-End, this is the ‘Administration Service’ which provides methods for the administrators to interact with the back-end (and its configuration) via the web interface on the front-end.

This connection is provided using sockets between the two sub-systems and a custom protocol, which is further explained in the ‘Back-End Protocol’ section later in this document.

Website Design

The News Feeder company site is a very informative place in the system. It gives users, or potential users, of the system a brief look into the inner workings of the team and the project. When designing the company website, emphasis was put into making a clean yet informative website where potential clients may be swayed by the professionalism.

Domain Registration

The team members decided to register a domain name fairly quickly after initial testing. We found that using IP addresses and ports to navigate through our website was tedious and time wasting. The domain www.News Feeder.com was not available due to it being a parked domain; however the new .CO top-level domain was available. Since the TLD was a retro new look we decided to obtain the domain www.News Feeder.co. Through the use of our domain registrars in-build DNS manager we also had access to the creation of subdomains (A records) and mail exchanges (MX records).

Hosts Purchasing

The purchasing of hosts proved to be a difficult issue for our team to decide on. In addition to the purchase of a domain and hosting for our company site, we needed a host powerful enough to also support the project itself. After looking on the market for a while we purchased the following host:

Host: VMPort

Location: Kansas City, US

Virtualization Type: OpenVZ

RAM: 1GB

Disk: 60GB

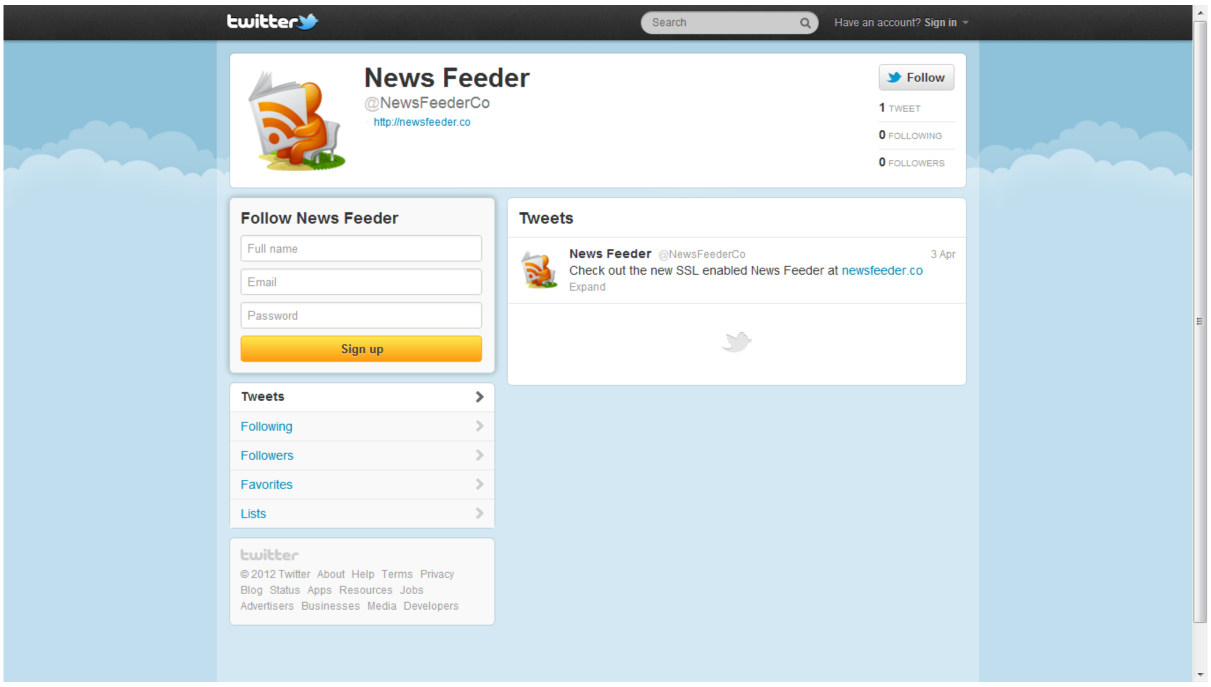
Bandwidth: 600GB

Price: 4.42 GBP (~$7 AUD)

Social Media

The use of social media becomes a great marketing tool as they become free advertising. The social media sites, Twitter and Facebook, are among the most popular social media services online and hence the creation of accounts on these was decidedly necessary. Here are screenshots from our social media pages:

Twitter



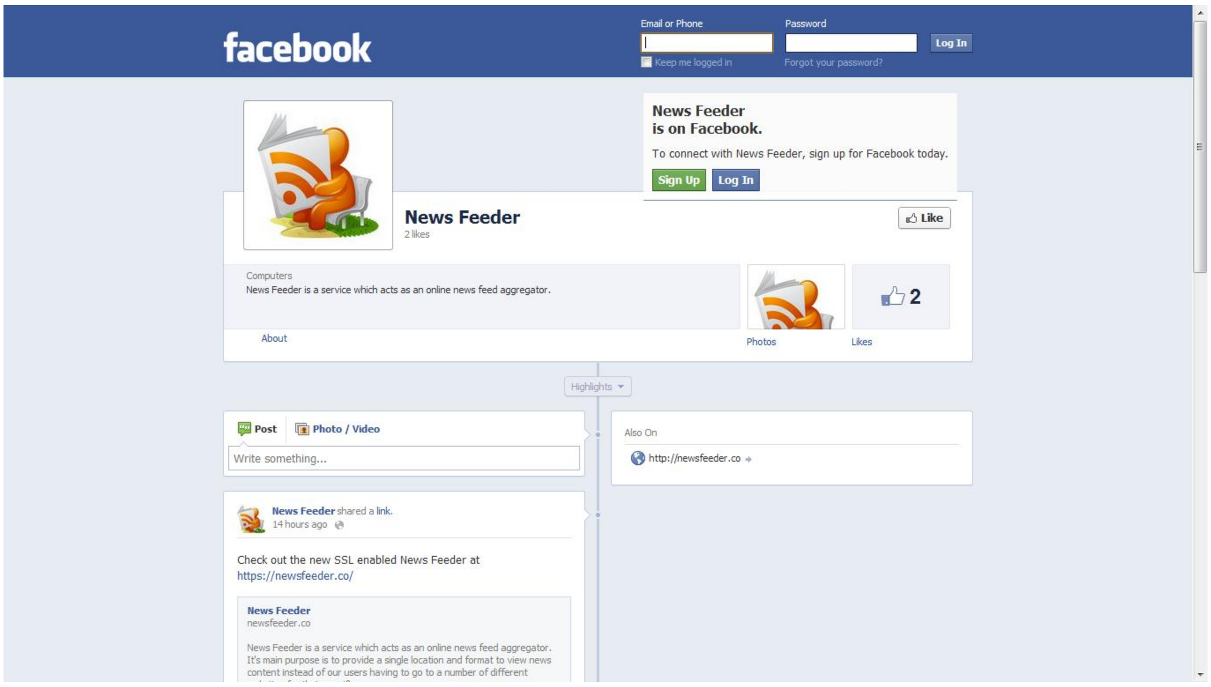
News Feeder
@NewsFeederCo
http://newsfeeder.co

1 TWEET
0 FOLLOWING
0 FOLLOWERS

Tweets

News Feeder @NewsFeederCo 3 Apr
Check out the new SSL enabled News Feeder at newsfeeder.co

Facebook



News Feeder
is on Facebook.
To connect with News Feeder, sign up for Facebook today.

News Feeder
2 likes

Computers
News Feeder is a service which acts as an online news feed aggregator.

2

http://newsfeeder.co

News Feeder shared a link.
14 hours ago

Check out the new SSL enabled News Feeder at
https://newsfeeder.co/

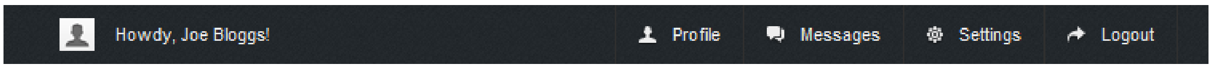
News Feeder
newsfeeder.co

News Feeder is a service which acts as an online news feed aggregator. It's main purpose is to provide a single location and format to view news content instead of our users having to go to a number of different

Application Design

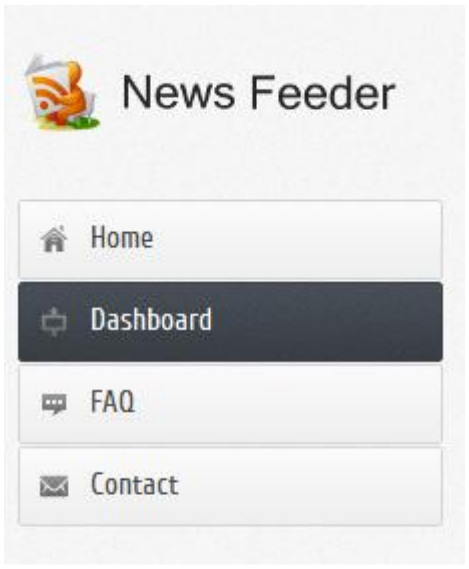
Global User Interface Design

Header



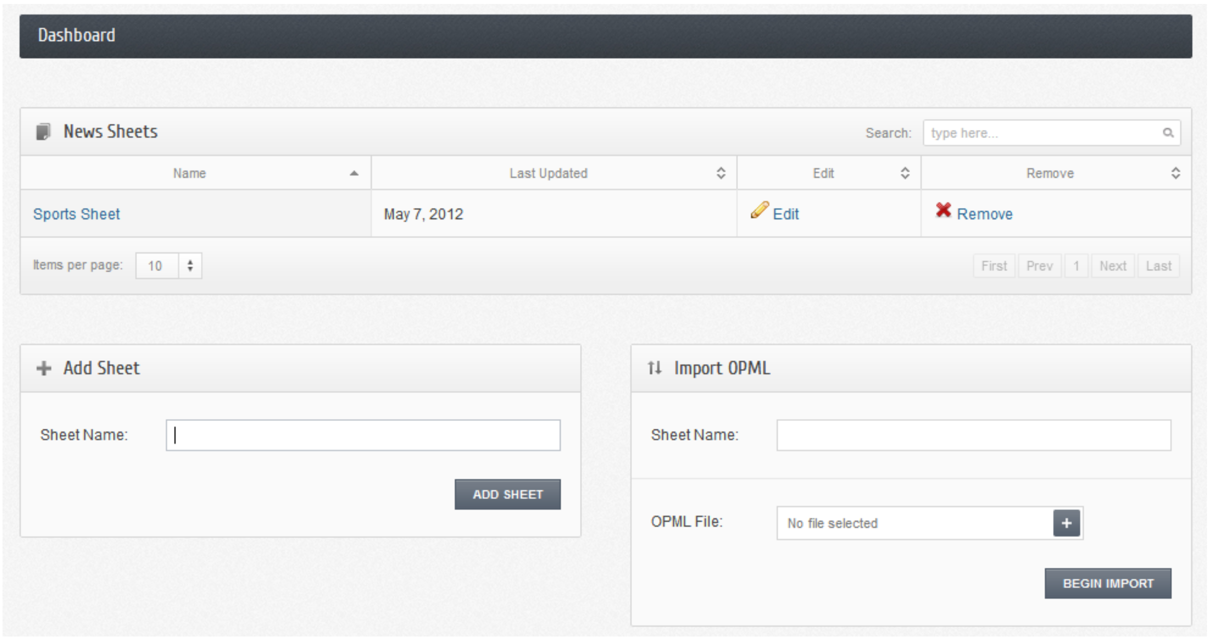
The dark grey navigation bar at the top of the page provides users with a personalized greeting, along with their profile picture to the left and some quick links on the right-hand side. The **Profile** link, to allow users to change settings like name ad e-mail address; the **Messages** link, to give users a quick way to see new updates and changes to sheets; the **Settings** link, to allow users to set global options such as SSL settings; and the **Logout** link for users to sign out of the system.

Side Bar



The left pane features the side bar. This navigation pane allows users to navigate the various static content of the page and the dynamic content that the dashboard creates. The **Home** link brings users to the index of the website, which features information and statistics about the website as a whole. The **Dashboard** link allows signed in users to navigate their sheets and related options. The **FAQ** link directs users to a page of Frequently Asked Questions about the service. The **Contact** link allows users to provide feedback on the service.

Main Content



Name	Last Updated	Edit	Remove
Sports Sheet	May 7, 2012	Edit	Remove

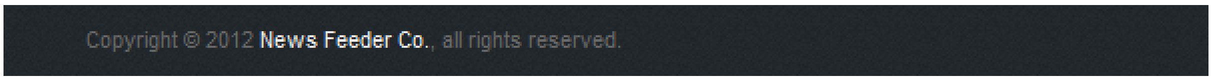
Items per page: 10 First Prev 1 Next Last

Sheet Name:

OPML File: No file selected

The content of each page is broken up into "widgets" with a wide heading at the top of the content section. These widgets group content to allow easy separation of forms and information. These widgets may span either the full length of the page or be split into left and right sides simultaneously.

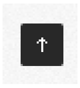
Footer


Copyright © 2012 News Feeder Co., all rights reserved.

The dark grey pane at the bottom of each page is a copyright text with a link to the company website.

Miscellaneous

Top of Page Button


When navigating long pages that span greater than the length of the screen a small button on the bottom right of the page appears. This follows the users scrolling to stay seemingly stationary.

Sheet Layouts

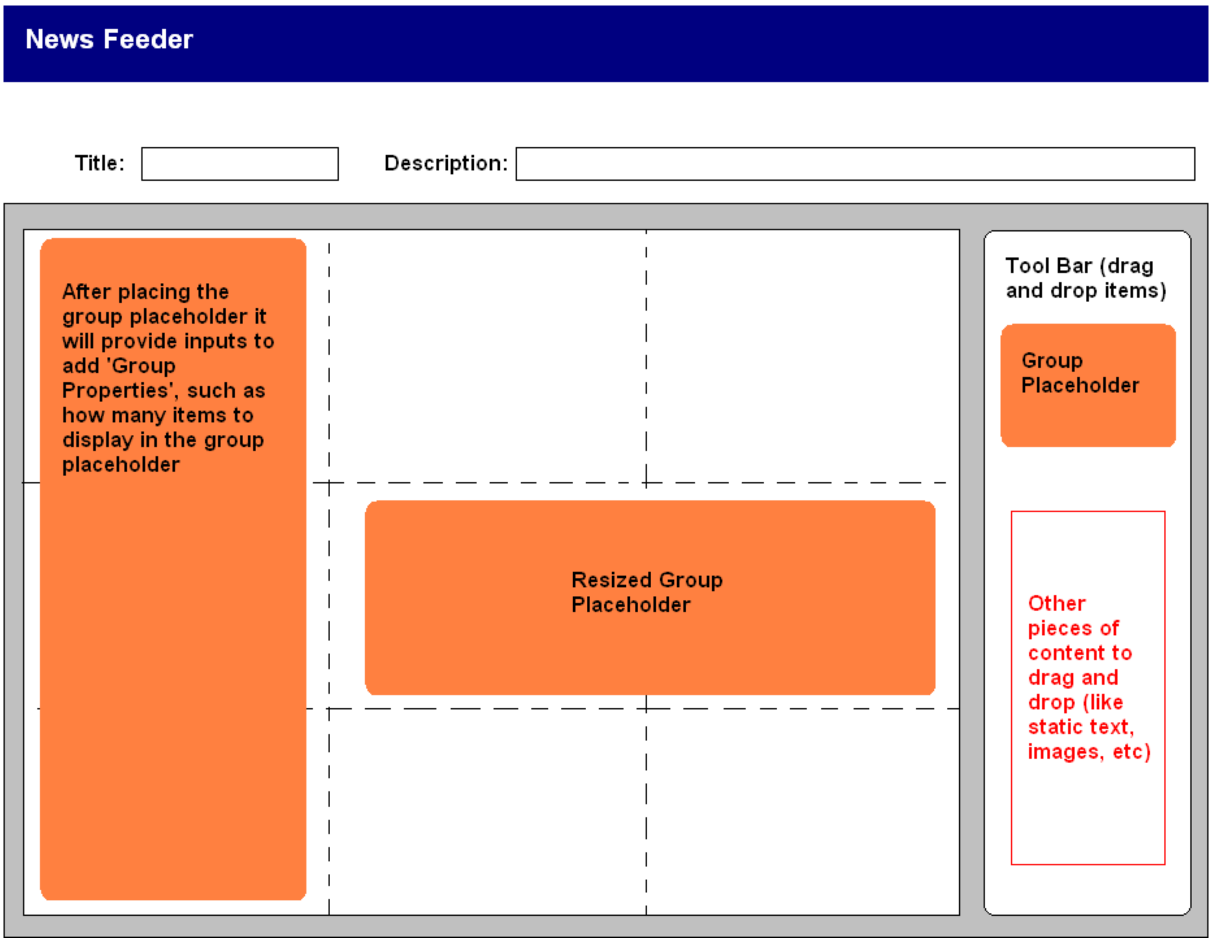
Users can set the style of a sheet (e.g. 2 column or 3 column layout) upon that sheet's creation; they can either select from a small number of predefined feeds or design their own custom sheet layouts. Custom sheet layouts are designed and managed using 3 main elements:

Layout

This is the initial design phase, here the user will select how many rows and columns they wish to have on their sheet.

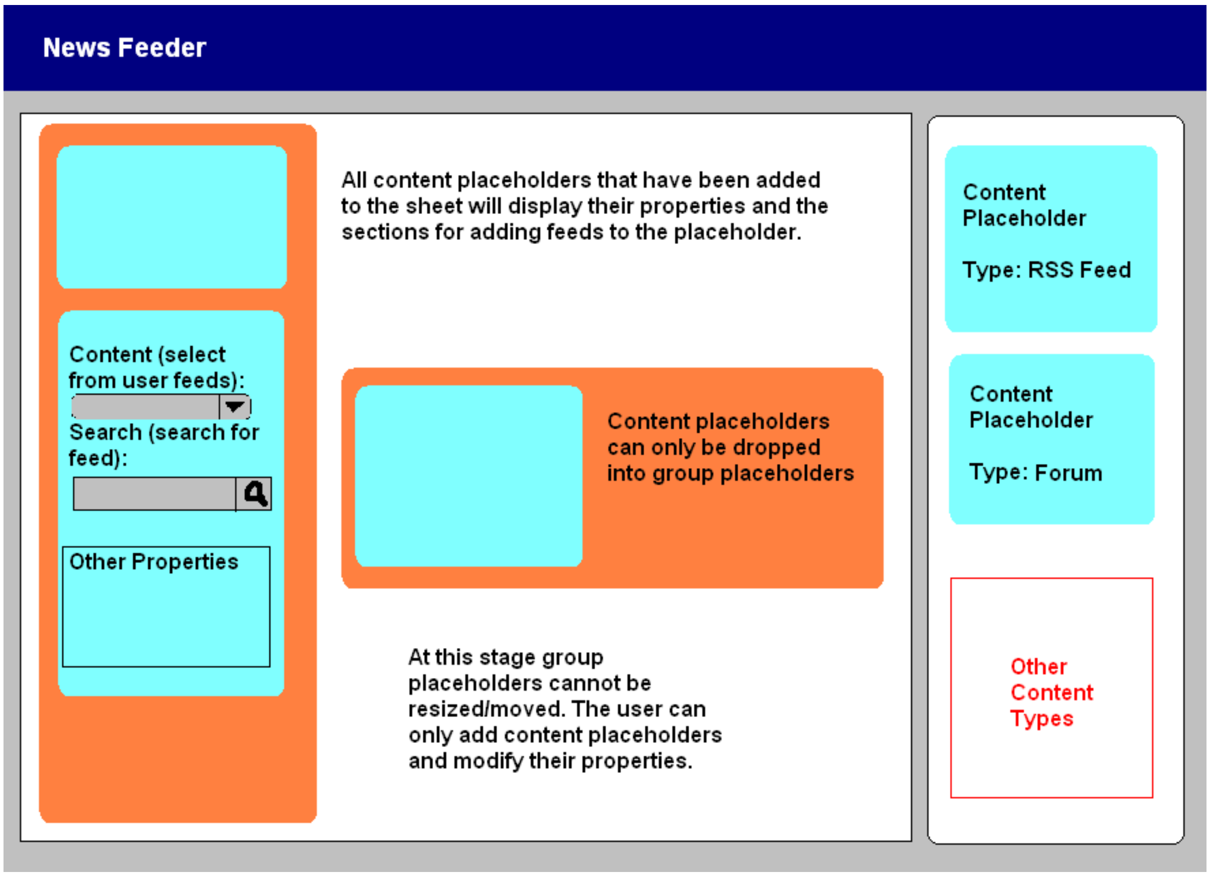
Group Placeholders

In this phase, the user will be able to click and drag elements called 'group placeholders' onto the layout previously created. These group placeholders define the areas where the content should be positioned on the sheet. The placeholders can also be resized to span multiple columns/rows defined by the layout.


News Feeder
Title:
Description:
After placing the group placeholder it will provide inputs to add 'Group Properties', such as how many items to display in the group placeholder
Resized Group Placeholder
Tool Bar (drag and drop items)
Group Placeholder
Other pieces of content to drag and drop (like static text, images, etc)

Feed Placeholders

The final phase of the design, here the user clicks and drags elements called 'feed placeholders' into the group placeholders available on the sheet. These feed placeholders are the locations content is shown when the sheet is displayed. The feed placeholders come in a number of types, depending on what type of content they are to display (such as RSS feed, weather). After positioning the feed placeholders a user will be able to select the feeds they wish to display inside it (by using the built-in feed search). They can also set a number of properties about how the feeds will be displayed (such as are images show, how many items from each feed).



All content placeholders that have been added to the sheet will display their properties and the sections for adding feeds to the placeholder.

Content placeholders can only be dropped into group placeholders

At this stage group placeholders cannot be resized/moved. The user can only add content placeholders and modify their properties.

Based on the layout used for a sheet, when the sheet is rendered it uses the positions of each element to place the content. It uses the layout to generate percentages to see how much room content should take up (e.g. if there are 2 columns, each will take up 50% of the sheet width).

Only administrators and subscribed users will be able to access the first 2 levels of the design process (layout and group placeholders), all other users will only be able to position the feed placeholders within pre-defined layouts.

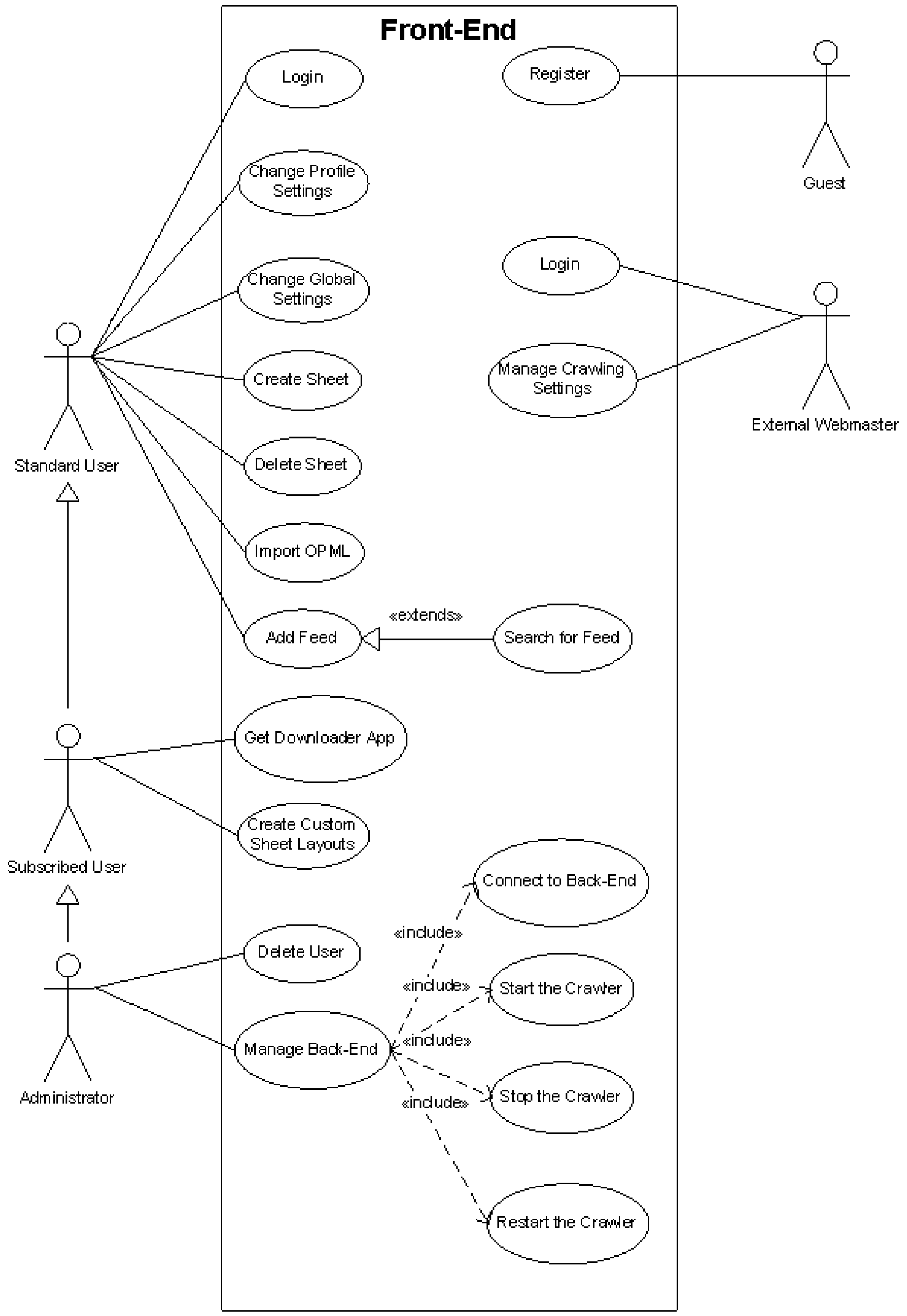
Search for Feeds

The search for feeds functionality will be provided through an interface which implements a memcache server. When a user requests a search for a particular term to be performed, a separate process begins searching for RSS feeds using Microsoft's Bing API. When this process obtains results they are stored in the memcache which will subsequently be displayed to the user without them having to reload the page.

Use Cases

Front-End Use Cases

Use Case Diagram



Use Case Scenarios

The following are the scenarios we defined for the above uses cases:

Use Case Name	Register
Primary Actor	Front-End
Summary	To create a user on the system
Pre-Condition	N/A
Normal Flow of Events	1. Front-End presents a registration form to the user 2. The user submits the form with their details 3. The Front-End presents the user with the login form
Extensions	Register Fail
Post-Conditions	N/A

Use Case Name	Login
Primary Actor	Front-End
Summary	To authenticate a user to the system
Pre-Condition	The user has registered an account on the system
Normal Flow of Events	1. Front-End presents a login form to the user 2. The user submits the form with their username and password 3. The Front-End presents the user with their dashboard
Extensions	Login Fail
Post-Conditions	Authenticated Front-End

Use Case Name	Change Profile Settings
Primary Actor	Front-End
Summary	To change details stored in the users profile
Pre-Condition	The user has logged in to the system
Normal Flow of Events	1. The user clicks on the **Profile** link 2. Front-End presents a form to enter updated user details 3. The user submits the form with updated details 4. The system updates the details on the system 5. The user is presented with a success message in their dashboard
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Change Global Settings
Primary Actor	Front-End
Summary	To change details stored in the users global settings
Pre-Condition	The user has logged in to the system
Normal Flow of Events	1. The user clicks on the **Settings** link 2. Front-End presents a form to enter new settings 3. The user submits the form with updated settings 4. The system updates the settings on the system 5. The user is presented with a success message in their dashboard
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Create Sheet
Primary Actor	Front-End
Summary	To add a sheet to a user's account
Pre-Condition	The user has logged in to the system AND there is no sheet with the same name
Normal Flow of Events	6. Front-End presents a field to enter the new sheet name 7. The user submits the new sheet name to the system 8. The system creates a new sheet with the name entered 9. The user is presented with a success message in their dashboard
Extensions	Create Sheet Fail
Post-Conditions	N/A

Use Case Name	Delete Sheet
Primary Actor	Front-End
Summary	To remove a sheet on a user's account
Pre-Condition	The user has logged in to the system AND there exists the sheet to delete
Normal Flow of Events	1. Front-End presents a table of sheets to the user 2. The user clicks the **Delete** link in the same row as the sheet they are deleting 3. The Front-End removes the sheet from the users account 4. The user is presented with a success message
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Import OPML
Primary Actor	Front-End
Summary	To import OPML into a sheet
Pre-Condition	The user has logged in to the system AND there is no sheet with the same name
Normal Flow of Events	1. Front-End presents a form to the user 2. The user submits the new sheet name and OPML file to the system 3. The system creates a new sheet with the name entered and the feeds within the OPML file 4. The user is presented with a success message in their dashboard
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Add Feed (Predefined)
Primary Actor	Front-End
Summary	To add a predefined feed to a sheet
Pre-Condition	The user has logged in to the system AND there exists the sheet being modified
Normal Flow of Events	1. Front-End presents the user with a list of existing feeds 2. The user clicks on the next empty space in the list 3. The system presents the user with a list of feeds to subscribe to 4. The user picks a feed and the feed is added to the list (the user may repeat from 2) 5. The user clicks the **Confirm** button
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Add Feed (From Search)
Primary Actor	Front-End
Summary	To add a new feed to a sheet
Pre-Condition	The user has logged in to the system AND there exists the sheet being modified
Normal Flow of Events	1. Front-End presents the user with a query box 2. The user submits a query term with the query box 3. The system presents the user with a list of feeds to subscribe to 4. The user picks a feed and the feed is added to the sheet
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Delete User
Primary Actor	Front-End
Summary	To delete a user from the system
Pre-Condition	The administrator has logged in to the system AND there exists the user being deleted
Normal Flow of Events	1. Front-End presents the administrator with a list of existing users 2. The administrator clicks on the **Delete** link next to the users username 3. The system will present the administrator with a success message
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Connect to Back-End
Primary Actor	Front-End
Summary	To connect to the back-end system and retrieve the crawlers status
Pre-Condition	The administrator has logged in to the system
Normal Flow of Events	1. Front-End presents the administrator with a **Connect** button 2. The administrator clicks the **Connect** button 3. The system presents the administrator with the crawlers status and buttons relating to it
Extensions	N/A
Post-Conditions	N/A

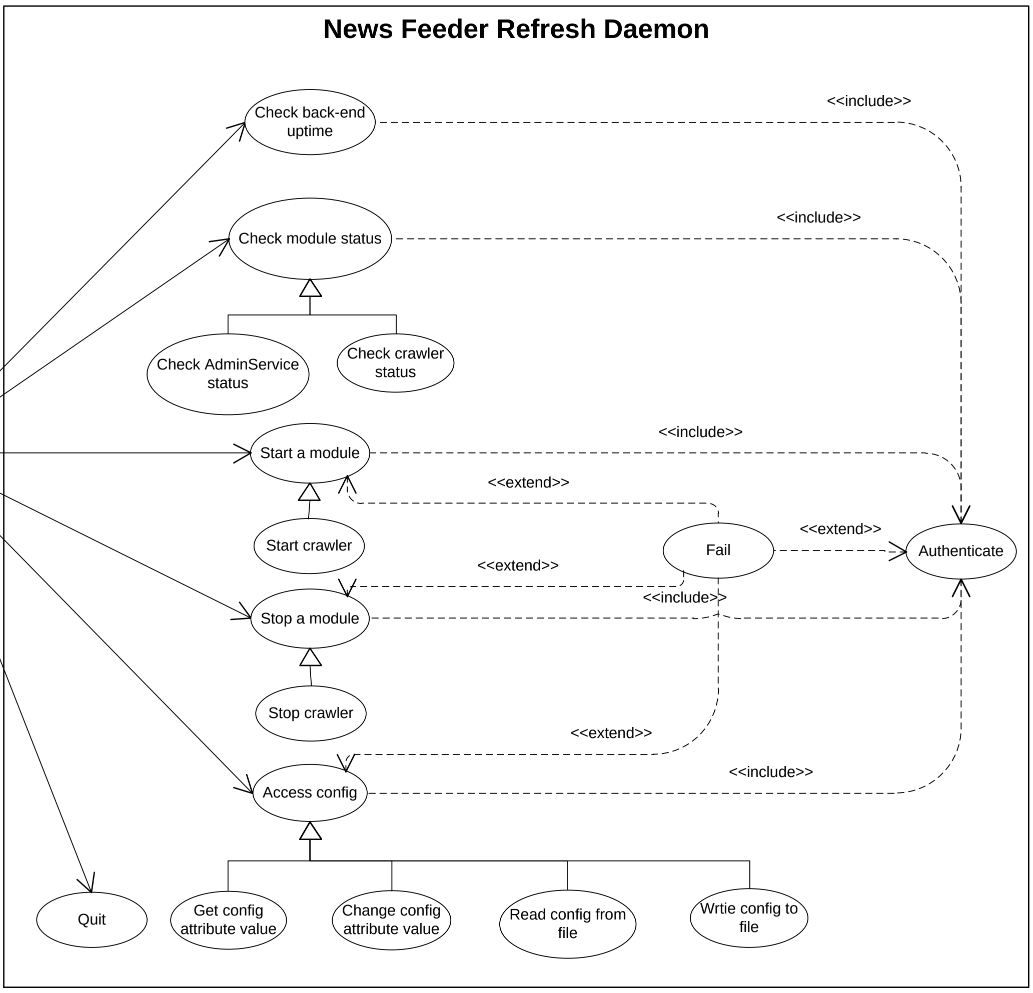
Use Case Name	Start the Crawler
Primary Actor	Front-End
Summary	To connect to the back-end system and start the crawler
Pre-Condition	The administrator has logged in to the system AND connected to the back-end
Normal Flow of Events	1. The system has presented the user with a **Start Crawler** button 2. The administrator clicks the **Start Crawler** button 3. The system provides confirmation the crawler started successfully
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Stop the Crawler
Primary Actor	Front-End
Summary	To connect to the back-end system and stop the crawler
Pre-Condition	The administrator has logged in to the system AND connected to the back-end
Normal Flow of Events	1. The system has presented the user with a **Stop Crawler** button 2. The administrator clicks the **Stop Crawler** button 3. The system provides confirmation the crawler stopped successfully
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Restart the Crawler
Primary Actor	Front-End
Summary	To connect to the back-end system and restart the crawler
Pre-Condition	The administrator has logged in to the system AND connected to the back-end
Normal Flow of Events	1. The system has presented the user with a **Restart Crawler** button 2. The administrator clicks the **Restart Crawler** button 3. The system provides confirmation the crawler restarted successfully
Extensions	N/A
Post-Conditions	N/A

Back-End Use Cases

Use Case Diagram



Use Case Scenarios

The following are the scenarios we defined for the above uses cases:

Use Case Name	Authenticate
Primary Actor	Front-End
Summary	To authenticate whether in-coming client is valid Front-End
Pre-Condition	The Front-End has a valid pair of username and password
Normal Flow of Events	1. Front-End sends username to the Back-End 2. Front-End receive prompt form the Back-End 3. Front-End sends password to the Back-End 4. Front-End receive "success" message
Extensions	Fail
Post-Conditions	Authenticated Front-End

Use Case Name	Fail
Primary Actor	Front-End
Summary	To receive the reason of failure
Pre-Condition	Execution of any use cases
Normal Flow of Events	1. Front-End receives fail message from the Back-End
Extensions	N/A
Post-Conditions	Disconnected by the Back-End

Use Case Name	Check back-end uptime
Primary Actor	Front-End
Summary	To get the uptime of back-end since started
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends "status uptime" to the Back-End 2. Front-End receives back-end uptime
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Check AdminService status
Primary Actor	Front-End
Summary	To get the status of AdminService module at the Back-End
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends "status" to the Back-End 2. Front-End receives status of all modules including AdminService module at the Back-End
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Check crawler status
Primary Actor	Front-End
Summary	To get the status of Crawler module at the Back-End
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends "status crawler" to the Back-End 2. Front-End receives status of Crawler module at the Back-End
Extensions	N/A
Post-Conditions	N/A

Use Case Name	Start crawler
Primary Actor	Front-End
Summary	To start the crawler module at the Back-End
Pre-Condition	Authenticated Front-End and stopped crawler module
Normal Flow of Events	1. Front-End sends "crawler start" to the Back-End 2. Front-End receive "success" message
Extensions	Fail
Post-Conditions	Running crawler module

Use Case Name	Stop crawler
Primary Actor	Front-End
Summary	To stop the crawler module at the Back-End
Pre-Condition	Authenticated Front-End and running crawler module
Normal Flow of Events	1. Front-End sends “crawler stop” to the Back-End 2. Front-End receive “success” message
Extensions	Fail
Post-Conditions	Stopped crawler module

Use Case Name	Get config attribute value
Primary Actor	Front-End
Summary	To get the value of an attribute in the configuration of the Back-End
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends “config get” along with configuration sector and attribute name to the Back-End 2. Front-End receive “success” message 3. Front-End sends “transfer” to the Back-End 4. Front-End receive the value of requested attribute
Extensions	Fail
Post-Conditions	N/A

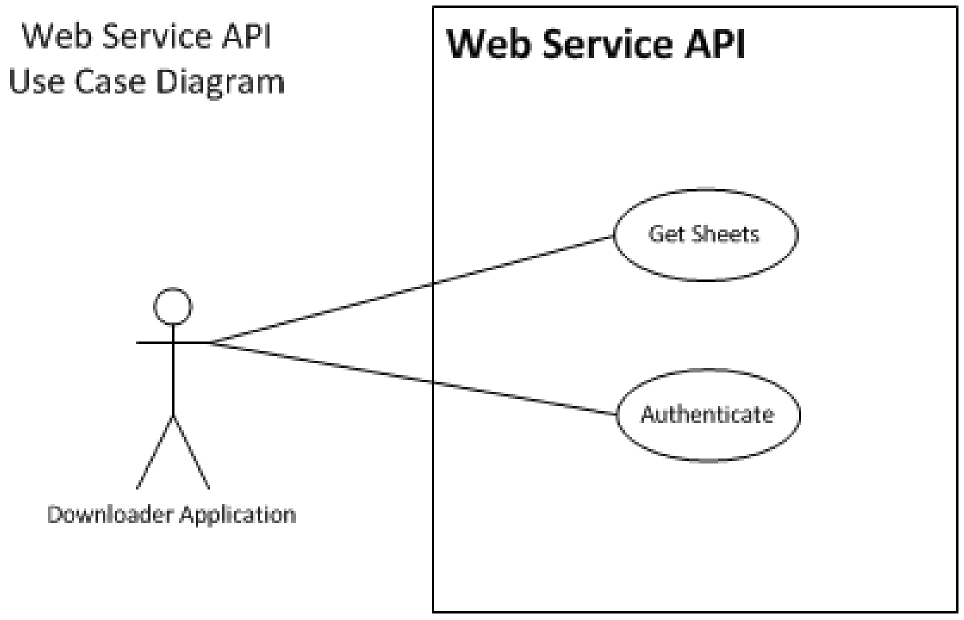
Use Case Name	Change config attribute value
Primary Actor	Front-End
Summary	To add or change the value of an attribute in the configuration of the Back-End
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends “config add” along with configuration sector name, attribute name and value to the Back-End 2. Front-End receive “success” message
Extensions	Fail
Post-Conditions	N/A

Use Case Name	Read config from file
Primary Actor	Front-End
Summary	To read configuration of the Back-End from a file local to the Back-End
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends “config load” along with the file name to the Back-End 2. Front-End receive “success” message
Extensions	Fail
Post-Conditions	N/A

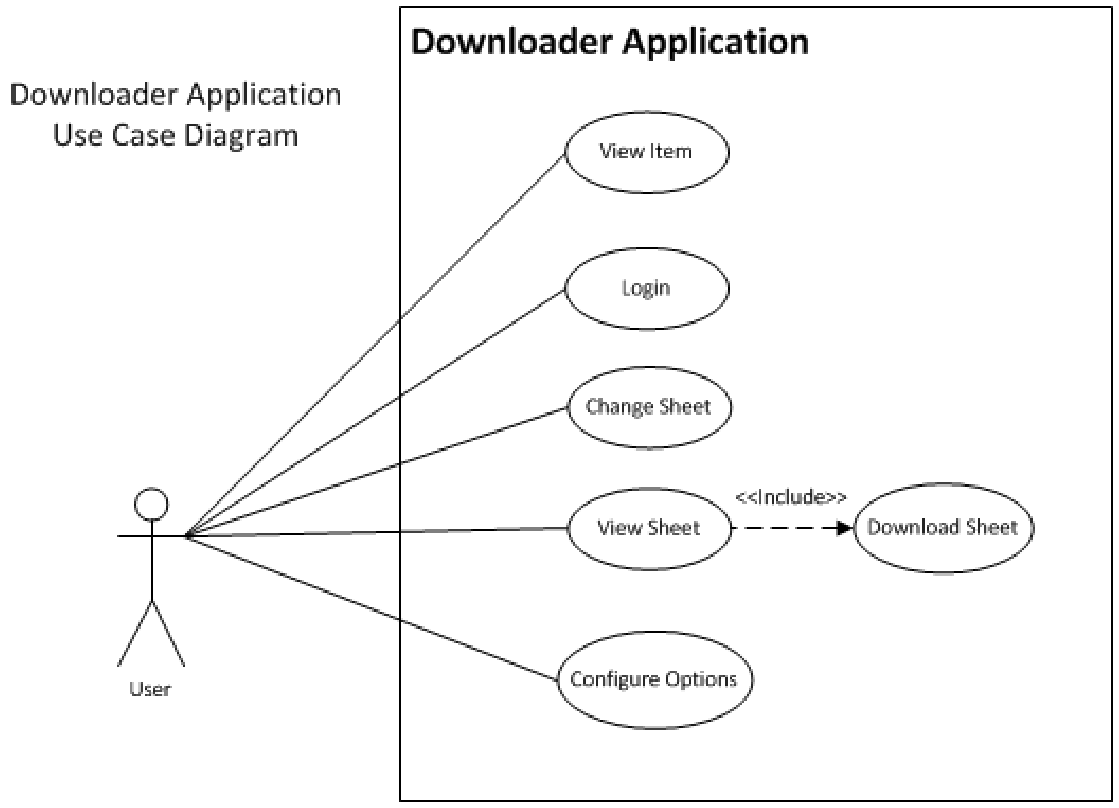
Use Case Name	Write config from file
Primary Actor	Front-End
Summary	To write configuration of the Back-End to a file local to the Back-End
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends "config save" along with the file name to the Back-End 2. Front-End receive "success" message
Extensions	Fail
Post-Conditions	N/A

Use Case Name	Quit
Primary Actor	Front-End
Summary	To disconnect the connection with the Back-End actively
Pre-Condition	Authenticated Front-End
Normal Flow of Events	1. Front-End sends "quit" to the Back-End
Extensions	N/A
Post-Conditions	N/A

Web Service API Use Case Diagram



Downloader Application Use Case Diagram



Use Case Name	View Item
Primary Actor	User
Summary	To view a specific item in the downloader application
Pre-Condition	Login View Sheet
Normal Flow of Events	1. Click on the title of a specific item on the screen
Extensions	1.1 The item was not found, error
Post-Conditions	1. The item view window opens and displays detailed information about the item

Use Case Name	Login
Primary Actor	User
Summary	Login into the downloader application to view sheets/items and download them for offline use.
Pre-Condition	N/A
Normal Flow of Events	1. Open the downloader application 2. Enter the username and password 3. Select the Login button
Extensions	3.1 The username and password are incorrect, an error is displayed to the user
Post-Conditions	1. The user is logged into the downloader application 2. The user is presented with the view sheet screen

Use Case Name	Change Sheet
Primary Actor	User
Summary	To change the current sheet view to a different sheet.
Pre-Condition	Login
Normal Flow of Events	1. Select the desired sheet from the dropdown
Extensions	1.1 A database error occurs and the sheet is not found or not cached for offline use, an error is presented to the user
Post-Conditions	1. The sheet view changes to the selected sheet

Use Case Name	View Sheet
Primary Actor	User
Summary	To view the current selected sheet
Pre-Condition	Login
Normal Flow of Events	1. The user selects the news feeder icon in the task tray
Extensions	N/A
Post-Conditions	1. The view sheet screen of the downloader application shows and the current sheet is visible to the user

Use Case Name	Configure Options
Primary Actor	User
Summary	To configure options available to the user regarding the behaviour of the downloader application
Pre-Condition	Login
Normal Flow of Events	1. The user selects the options button from the task tray or from the downloader application screen 2. The user alters the options as per their preferences 3. The user selects the save button
Extensions	3.1 A validation error occurs on the options and the user is presented with an error message 2.1 The user selects the cancel button to cancel the editing of the options
Post-Conditions	1. The options screen is closed

Use Case Name	Download Sheet
Primary Actor	User
Summary	To download a sheet in a PDF format
Pre-Condition	Login
Normal Flow of Events	1. The user selects the PDF icon on their sheet 2. The user selects where they would like to save the PDF
Extensions	N/A
Post-Conditions	1. A PDF containing detailed information about the items in the current sheet is downloaded into the directory the user specified.

Database Design

Data Dictionary

Table: censor

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
word	TEXT		NO	None	Word that must be censored

Table: comments

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
itemid	INTEGER		NO	None	The item the comment resides in
author	TEXT		NO	None	The author of the comment
via	TEXT		YES	NULL	The site where the comment was made
date	TIMESTAMP		YES	NULL	The date the comment was published
comment	TEXT		NO	None	The comment text
avatar	MEDIUM BLOB		YES	NULL	The comment authors avatar

Table: cph

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
name	TEXT		NO	None	The name of the content placeholder
columns	INTEGER		NO	None	The number of columns the content placeholder spans
groupphid	INTEGER		YES	NULL	The ID of the group placeholder it belongs to

Table: cph_feeds

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
cphid	INTEGER		NO	None	The ID of the content placeholder it belongs to
sheetid	INTEGER		NO	None	The ID of the sheet the feeds reside in
amount	INTEGER		NO	None	The amount of items to display
adultfilter	BOOLEAN		NO	NO	Whether to censor bad words

Table: feeds

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
url	TEXT		NO	None	Word that must be censored
name	TEXT		NO	None	The name of the feed
frequency	INTEGER		NO	0	Update frequency (mins)
lastupdate	TIMESTAMP		YES	NULL	Time of last update
category	TEXT		YES	NULL	Category of feed
type	INTEGER		NO	None	Integer representing feed type (RSS, ATOM etc.)

Table: gph

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
name	INTEGER		NO	None	The name of the group placeholder
sheetid	TEXT		NO	None	The ID of the sheet it belongs to
columns	INTEGER		NO	None	The number of columns the group placeholder spans

Table: images

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
itemid	INTEGER		NO	None	The item the image resides in
image	LARGE BLOB		NO	None	The binary image

Table: items

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
feedid	TEXT		NO	None	Word that must be censored
title	TEXT		NO	None	The title of the article
url	TEXT		NO	None	The URL of the original
content	TEXT		NO	None	The article text
postdate	TIMESTAMP		YES	NULL	The publish date of the article
author	TEXT		YES	NULL	The authors name
geolocation	TEXT		YES	NULL	The co-ordinates of the article

Table: layouts

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
rows	INTEGER		NO	None	Number of rows in the layout
columns	INTEGER		NO	None	Number of columns in the layout

Table: notifications

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
username	TEXT		NO	None	Username the notification is for
sheetid	INTEGER		NO	None	The ID of the sheet that was updated

Table: session

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
username	TEXT		NO	None	The username of the users session
key	TEXT		NO	None	A unique session identifier
time	TIMESTAMP		NO	None	When the session was created

Table: sheets

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
layoutid	INTEGER		NO	None	The layout of the sheet
name	TEXT		NO	None	Word that must be censored
username	TEXT		NO	None	The username of the creator of the sheet
updated	TIMESTAMP		YES	NULL	The time of last update

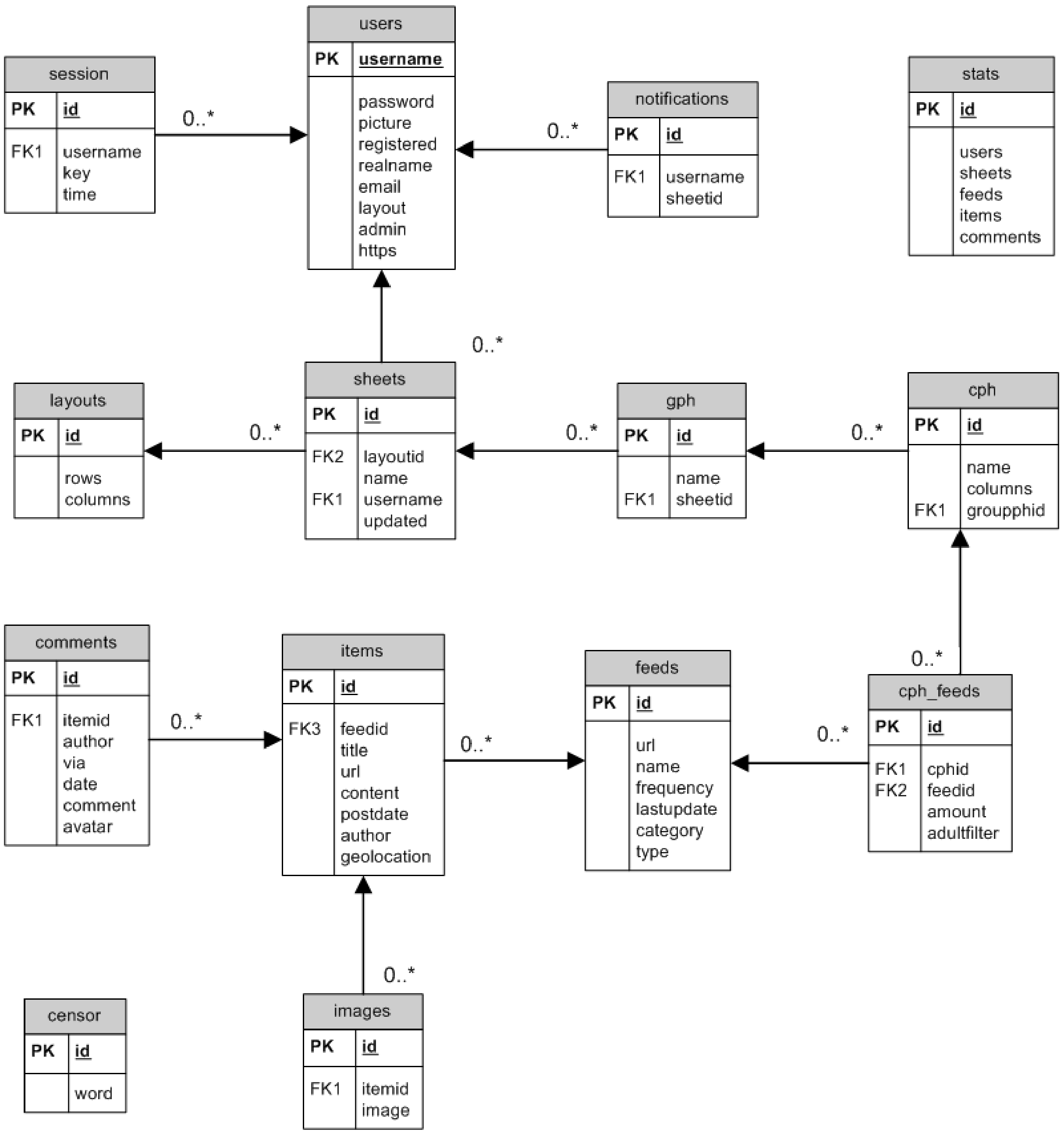
Table: stats

Field Name	Data Type	Primary Key	Null?	Default Value	Description
id	INTEGER	✓	NO	None	Unique identifier
users	INTEGER		NO	None	Number of users in the system
sheets	INTEGER		NO	None	Number of sheets in the system
feeds	INTEGER		NO	None	Number of feeds in the system
items	INTEGER		NO	None	Number of items in the system
comments	INTEGER		NO	None	Number of comments in the system

Table: users

Field Name	Data Type	Primary Key	Null?	Default Value	Description
username	TEXT	✓	NO	None	The username of the user
password	TEXT		NO	None	The password of the user
picture	MEDIUM BLOB		YES	NULL	The binary image of the user
registered	TIMESTAMP		NO	None	The timestamp of when the user first created their account
realname	TEXT		NO	None	The users full name
email	TEXT		NO	None	The users e-mail address
layout	INTEGER		NO	0	An integer representing which interface layout the user prefers
admin	BOOLEAN		NO	False	Represents whether the user is an administrator
https	BOOLEAN		NO	True	If true, the service will force HTTPS protocol

Entity Relationship Diagram



Interactions

Back-End Protocol

This section contains defines the protocol which communicates with the front-end of the News Feeder service. Currently, the protocol is plaintext for readability, but this is a stop-gap measure as it offers less efficient and security. In the next version of this protocol will be based on binary, and in future versions, the protocol will be encapsulated by a security layer.

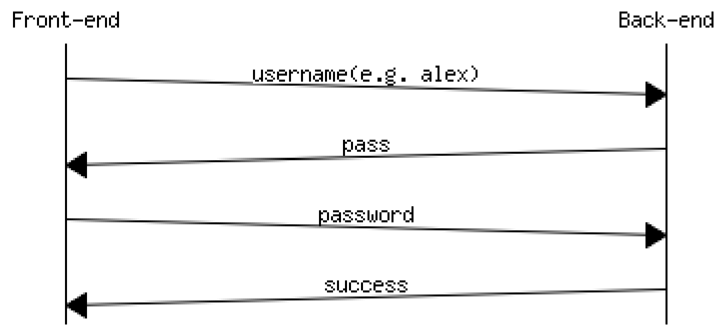
Sockets

The back-end listens to both Unix sockets and TCP sockets as defined by the config file. The user can turn off the listening to either of these types by modifying the config file. The two different types are included because each type offers advantages based on whether or not the front-end and back-end are based on the same machine. If they are installed on the same machine Unix sockets are suggested and TCP sockets are turned off in order to prevent external attacks. On the hand, if they are installed in different servers, TCP sockets are used and Unix sockets are turned off.

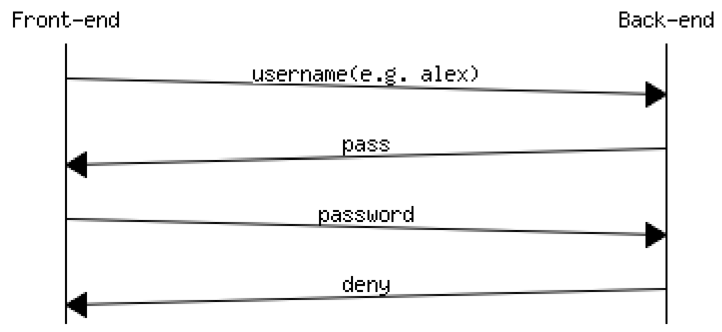
Login

Before the front-end can communicate with and control the back-end, it must first login and be authenticated. The front-end must provide a username and password for authentication.

Success case



Fail case

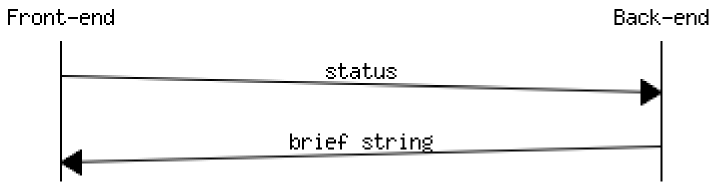


status - Check the status

The front-end can check the status of the back-end via "status" and combine sub-commands as following:

status [sub-command]

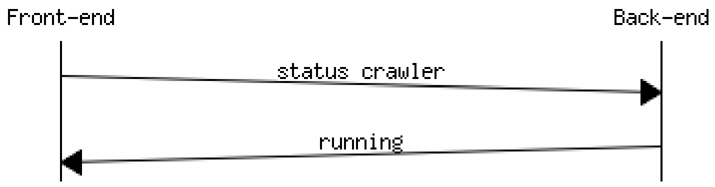
If sub-command is not provided, the back-end will send a brief string to the front-end. This string may not be parsed by the front-end but is human readable.



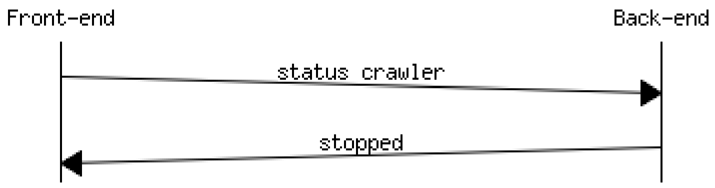
In the later versions, statistical information will be available on the front-end.

crawler - crawler status

This sub-command "crawler" will tell whether the crawler is running or not.
If the crawler is currently running, it will return "running":



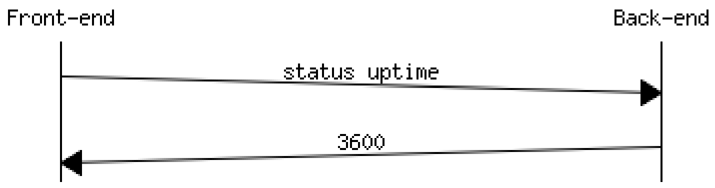
If the crawler is currently stopped, it will return "stopped":



Note: There are 4 statuses: running, stopped, stopping and starting.

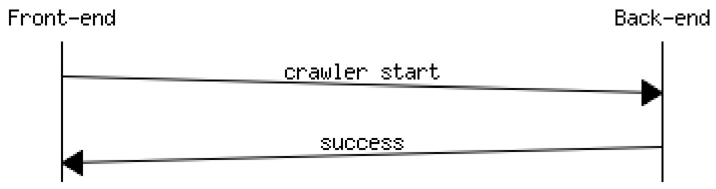
uptime - Back-end uptime

This sub-command "uptime" will return how many seconds that the back-end has run.
For example: (the server has been running for 1 hour)

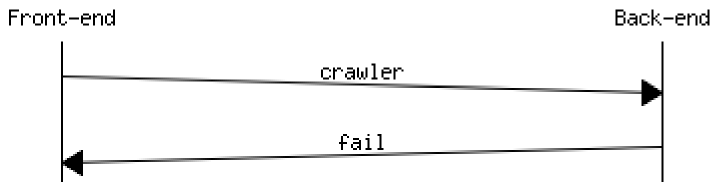


crawler - Control the crawler

The crawler command in this version of protocol is under the assumption that the back-end is only running one crawler (however, the back-end is designed to handle multiple crawler at one time, so future versions will remove this assumption).
Same as command ***status - Check the status***, this command is used with sub-commands while a sub-command is required. For example:

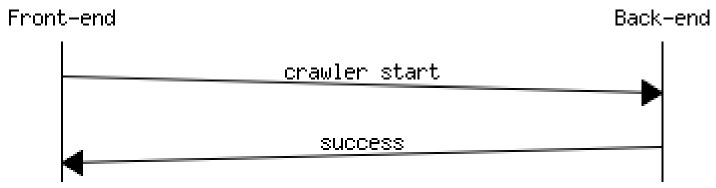


If no sub-command is attached to the command "crawler", the back-end will return a "fail":

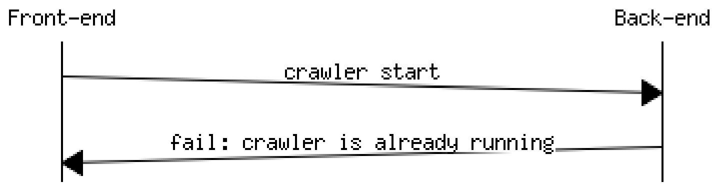


start - Start the crawler

This sub-command "start" tells the back-end to start the crawler:



If exceptions are thrown and caught by the back-end, it will return a "fail" with the error message separated by a ": ":

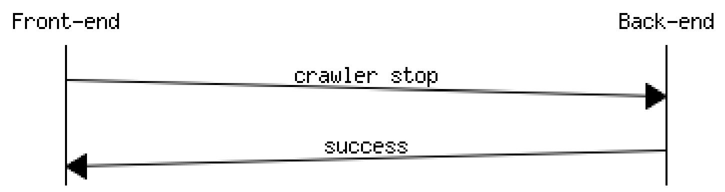


status - Check the status of the crawler

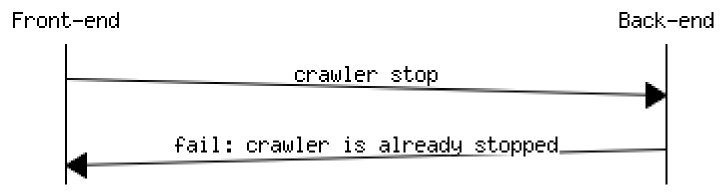
This sub-command "status" performs the same function as the command "status crawler".

stop - Stop the crawler

This sub-command "stop" tells the back-end to stop the crawler:

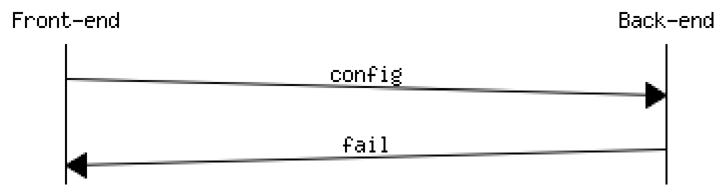


If exceptions are thrown and caught by the back-end, it will return a "fail" with error message separated by a ": ":



config - Configure back-end

The "config" command allows the direct control of the config information at the back-end. Like ***crawler - Control the crawler***, a sub-command is required when using this command.

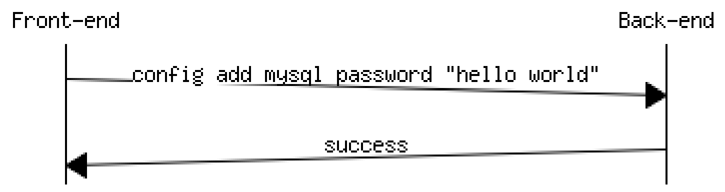


add - Add/Change an attribute

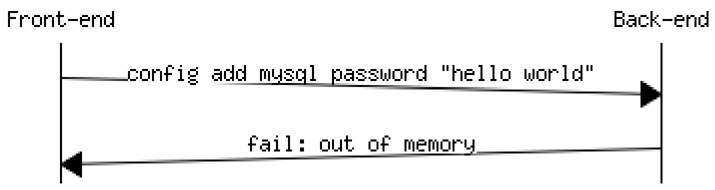
This sub-command "add" tells the back-end to add or change an attribute. The syntax for this command is:

config add sector attribute value

The sector and attribute should not contain whitespaces. It will take everything after attribute as the value of that attribute. For example:



In this example, "mysql" is parsed as sector name, "password" is parsed as attribute name, and "hello world" is parsed as its value. This command may fail (because of memory problem or others) and it will return a "fail" with error message separated by a ": ":



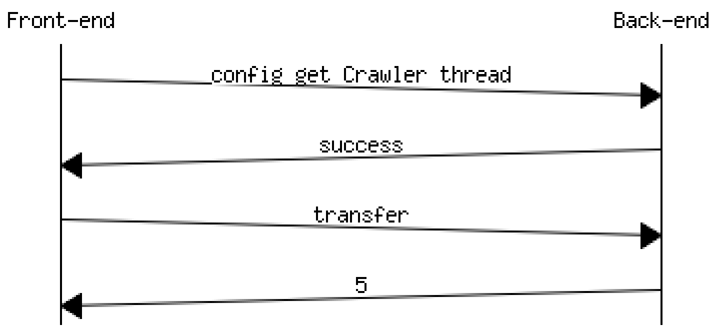
If the required sector or attribute does not exist, it will automatically add a new one. If the attribute is already there, the back-end will change it.

get - Return an attribute

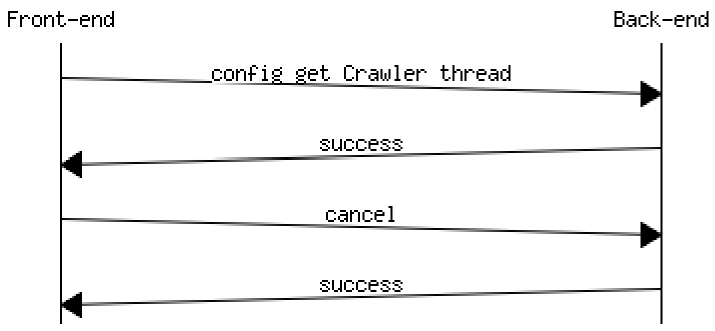
This sub-command "get" tells the back-end to get the value of an attribute. The grammar for this command is:

config get sector attribute

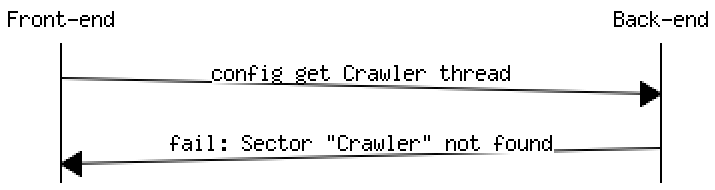
The back-end will search for this attribute as requested. If the request is successful, the back-end will return "success". Otherwise, it will return "fail", followed by an error message. On a successful request, the front-end can get the value back by sending "transfer".



Of course, the front-end can cancel this by sending "cancel" or a garbage string.



Also, if the sector or the attribute is not available:

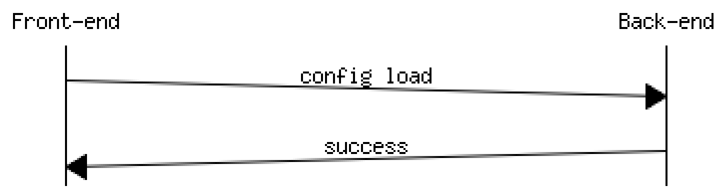


load - Load configuration file

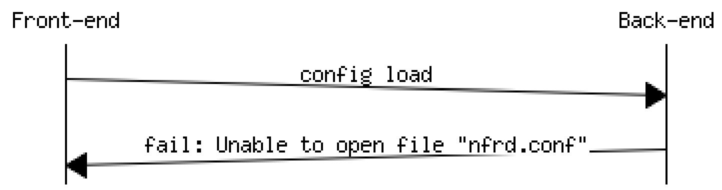
This sub-command "load" tells the back-end to load all configurations from a config file. The grammar for this command is:

config load [file]

Where "file" is optional. Note: The default config file is "nfrd.conf" which is hard coded in the nfrd program. It will return "success" on success or "fail" followed by error message on failure.
Success case:



Fail case:

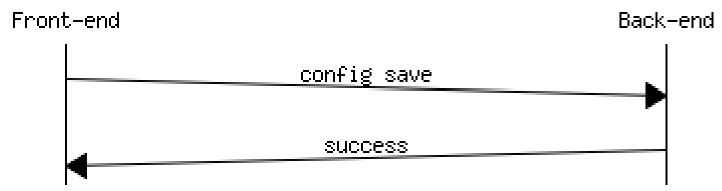


save - Save configuration file

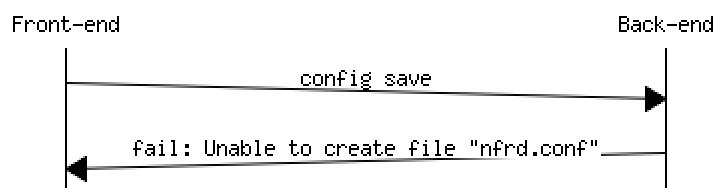
This sub-command "save" tells the back-end to save all configurations to a config file. The grammar for this command is:

config save [file]

Where "file" is optional. Note: The default config file is "nfrd.conf" which is hard coded in the nfrd program. It will return "success" on success or "fail" followed by error message on failure.
Success case:

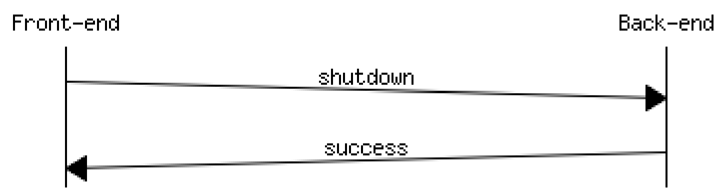


Fail case:

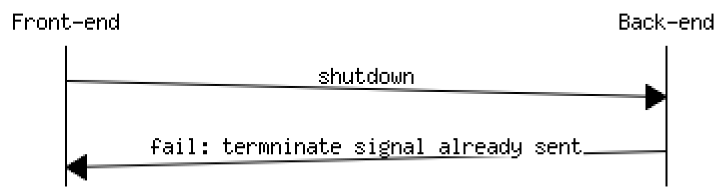


shutdown - Shut down the Back-End

Shut down the Back-End process in a safe way. Stopping all modules and unloading them so it can then terminate itself. Success case:



Fail case:

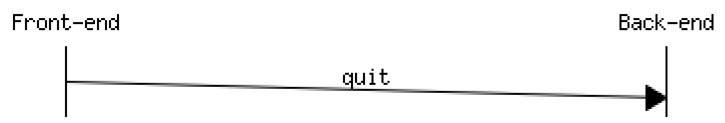


Warning:

This command should be used for maintenance only.

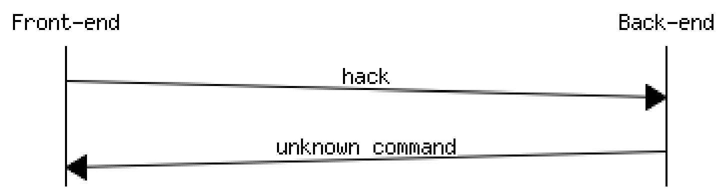
quit - Close connection

After all communication with the back-end, the front-end should say good-bye, which is "quit" in this case, to the back-end to close the connection between them.



Unknown command handling

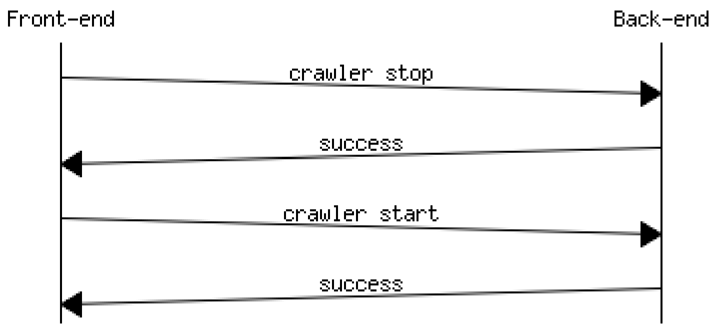
If a command is not supported by the back-end, a message of "unknown command" will be returned.



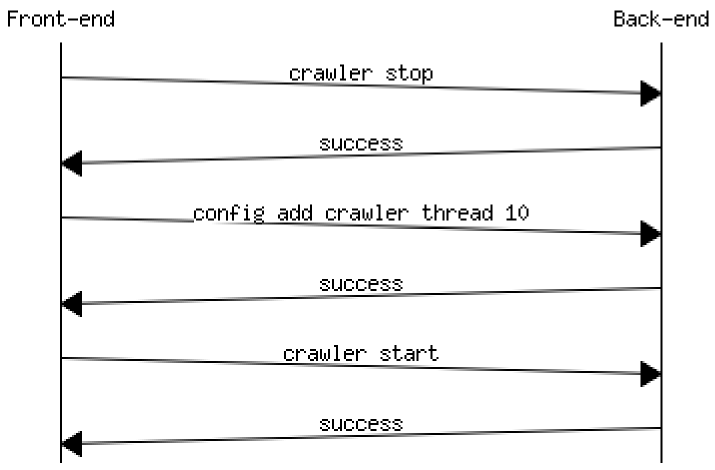
Examples

Here are some examples for advanced operations.

Restart the crawler



Change the number of threads used by the crawler



Algorithms and Logic

Back-End Logic

Overall

Back-End can be divided into two parts: Master and modules. Master works as a manager of all modules. It loads modules according to the configuration file and can also dynamically start, stop, load, unload modules without restarting the Back-End. The modules are independent by design.

Parse Feed

The Back-End dynamically using different parser; parses the sources obtained from the URL given by the Crawler according to the source type. After parsing, items are generated and stored in the database by Crawler module via NFDB Shared library.

Patch-Match Algorithm

Alias: Match and Patch. When parsing the RSS feed, if a RSS file does not contain the full text of the content the Back-End will trace into the original URL of the content and fetch the HTML page using libcurl. The Back-End then tries to find the full content and match the brief content in the RSS file to the contents source. If it can be found, the Back-End will obtain the extra article content.

Crawler Queuing

The back-end uses a priority queue (i.e. a heap) in order to store the feeds to be crawled. This queue is run continuously with feeds being taken off, to be crawled and parsed, then added back onto the end of the queue.

The priority used for the queuing is based off the following algorithm:

$$\text{Priority} = \text{Priority Constant} * \frac{\text{Number of items waited for since last crawl}}{\text{Average number of items waited for between new content}}$$

This algorithm is re-calculated every time an item (or batch of items) is taken off the queue. As the number of wait increases, the priority increases meaning it is more likely to be chosen. Also, feeds with less time between new content (i.e. feeds that are updated more quickly) will increase in priority much more quickly than other feeds.

The priority constant is a value that will always be greater than 1, with this value being based off a number of feed factors (such as the number of people subscribed and the type of feed). It is only calculated on the initial queue start and at spaced, regular intervals.

Usage of third-party libraries

libcurl

libcurl is a free and easy-to-use client-side URL transfer library under a MIT/X derivate license. This library is used for easy fetching file from the Internet at Back-end. For example: Fetch RSS files from a website and pass it to a RSS parser.

RapidXML

RapidXML is an attempt to create the fastest XML parser possible, while retaining useability, portability and reasonable W3C compatibility written in C++. It is used as an XML parser for the Back-End. For example: Parse RSS feed items from a RSS file obtained using libcurl.

SimplePie

SimplePie is a PHP class that allows RSS and ATOM feeds to be parsed in PHP. The class includes functions to process data within the feeds and obtain it in an appropriate way. For example: Attempt to parse a feed and detect whether it is valid or not.

MySQL++

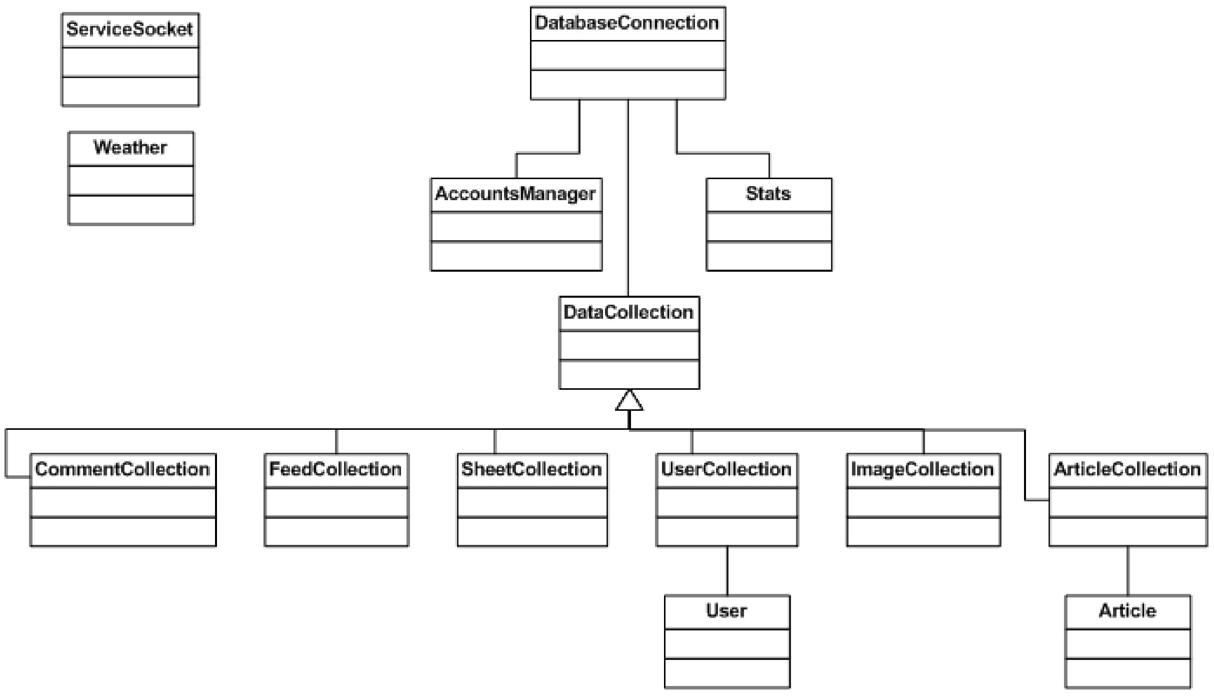
MySQL++ is a C++ wrapper for MySQL's C API that is designed around the same principles as a standard C++ library. It is by the Shared Database Library to interact with the MySQL database with a C++ interface.

SWIG

SWIG (Simplified Wrapper and Interface Generator) is an open source software tool used to connect C or C++ libraries with other programming and scripting languages. It is used to construct the interfaces for the shared database library, so it can be used by the Front-End (PHP), Back-End (C++) and web service (Java).

Front-End Class Documentation

Front-End Class Diagram

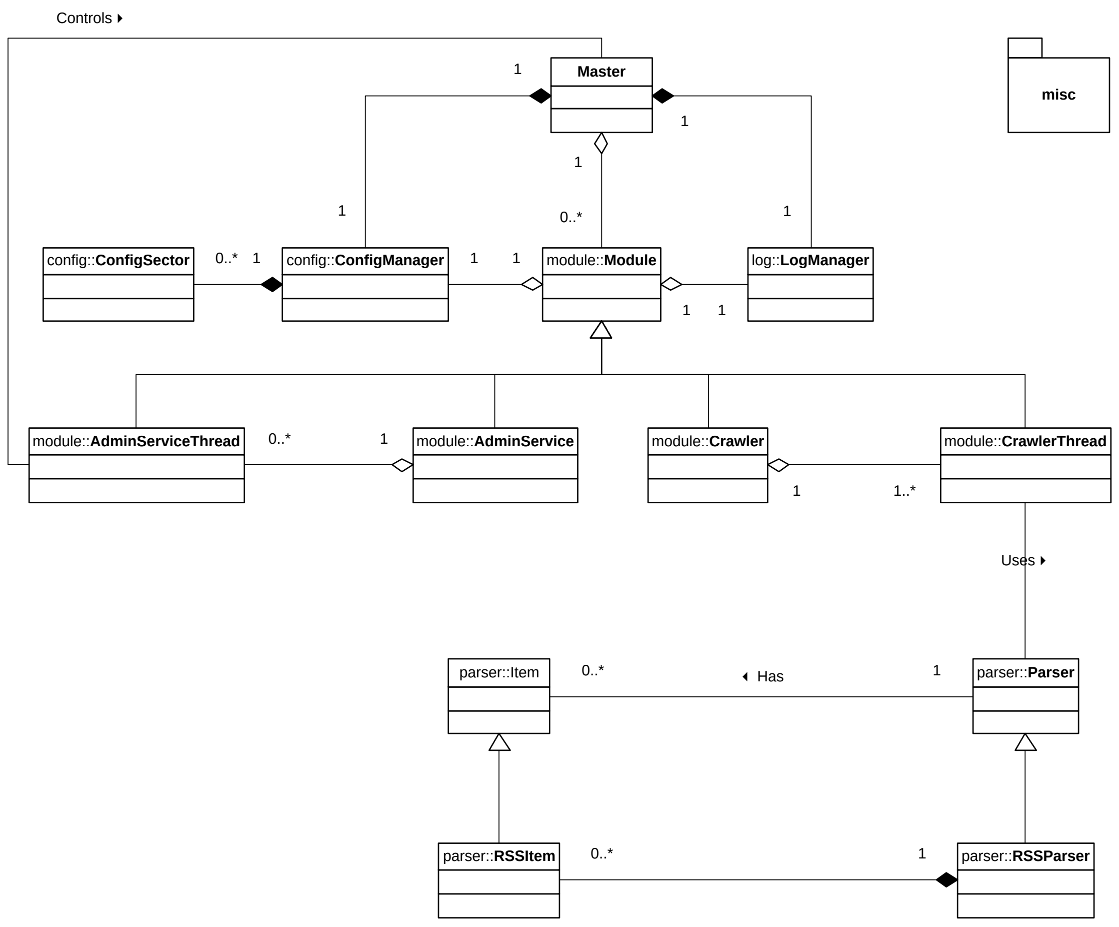


Front-End Class Descriptions

Full name of the class	**Brief Description**
AccountsManager	Provides methods for the creation and authentication of user accounts
Article	Provides storage class with getters for a single article
ArticleCollection	Provides a storage class for Articles in a particular sheet
CommentCollection	Provides a storage class for Comments on a particluar item
DatabaseConnection	A database controller with methods for each SQL related query
DataCollection	Provides a generic storage class with functions for extended classes
FeedCollection	Provides a storage class for Feeds in a particular sheet
ImageCollection	Provides a storage class for Images in a particular article
ServiceSocket	Connects to the Back-End controlling service
SheetCollection	Provides a storage class for Sheets that belong to a user
Stats	Generates front page statistics
User	Identifies a particular user of the service
UserCollection	Provides a storage class for all users of the system for administration purposes
Weather	Calls the Google Weather API for weather data

Back-End Class Documentation

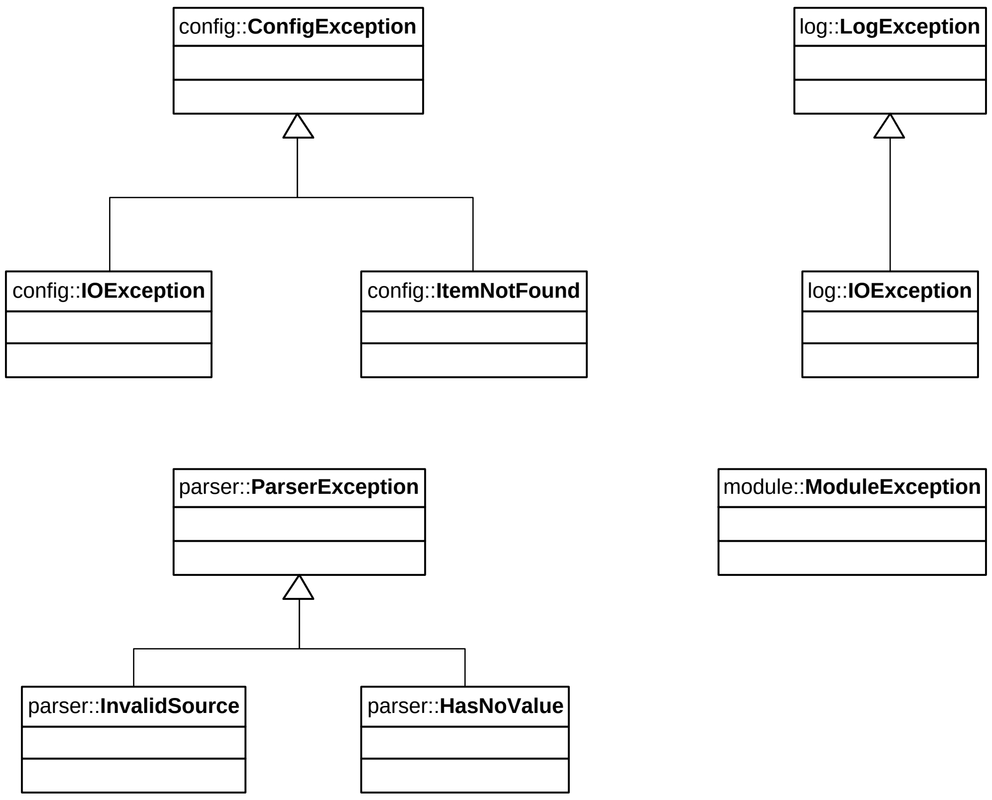
Back-End Class Diagram



Back-End Class Descriptions

Full name of the class	**Brief Description**
nfrd::module::AdminService	Manage sockets talk to the front end and interacts with other components
nfrd::module::AdminServiceThread	Handle sockets talk to the front end and interacts with other components
nfrd::config::ConfigManager	Manages config files (core class)
nfrd::config::ConfigSector	A part of ConfigManager (as a container)
nfrd::module::Crawler	Spawn CrawlerThreads to crawl feeds according to the database
nfrd::module::CrawlerThread	Crawl feed and send back parsed feed to the databse
nfrd::misc::DateTime	A class to store date and time
nfrd::parser::Item	A class to store details of an item obtained by the Parser
nfrd::log::LogManager	Manage logs
nfrd::Master	Manage, contain and access all components of nfrd
nfrd::module::Module	A generalised module interface class, providing all the interfaces of a module that start or stop
nfrd::parser::Parser	A generalised parser interface class, providing all the interfaces of a class that reads resource from an URL and parse it into a list of Item
nfrd::parser::RSSItem	A class to store details of an item obtained by the RSSParser
nfrd::parser::RSSParser	A parser to parse RSS feeds
nfrd::misc::Utility	Contains all utility functions

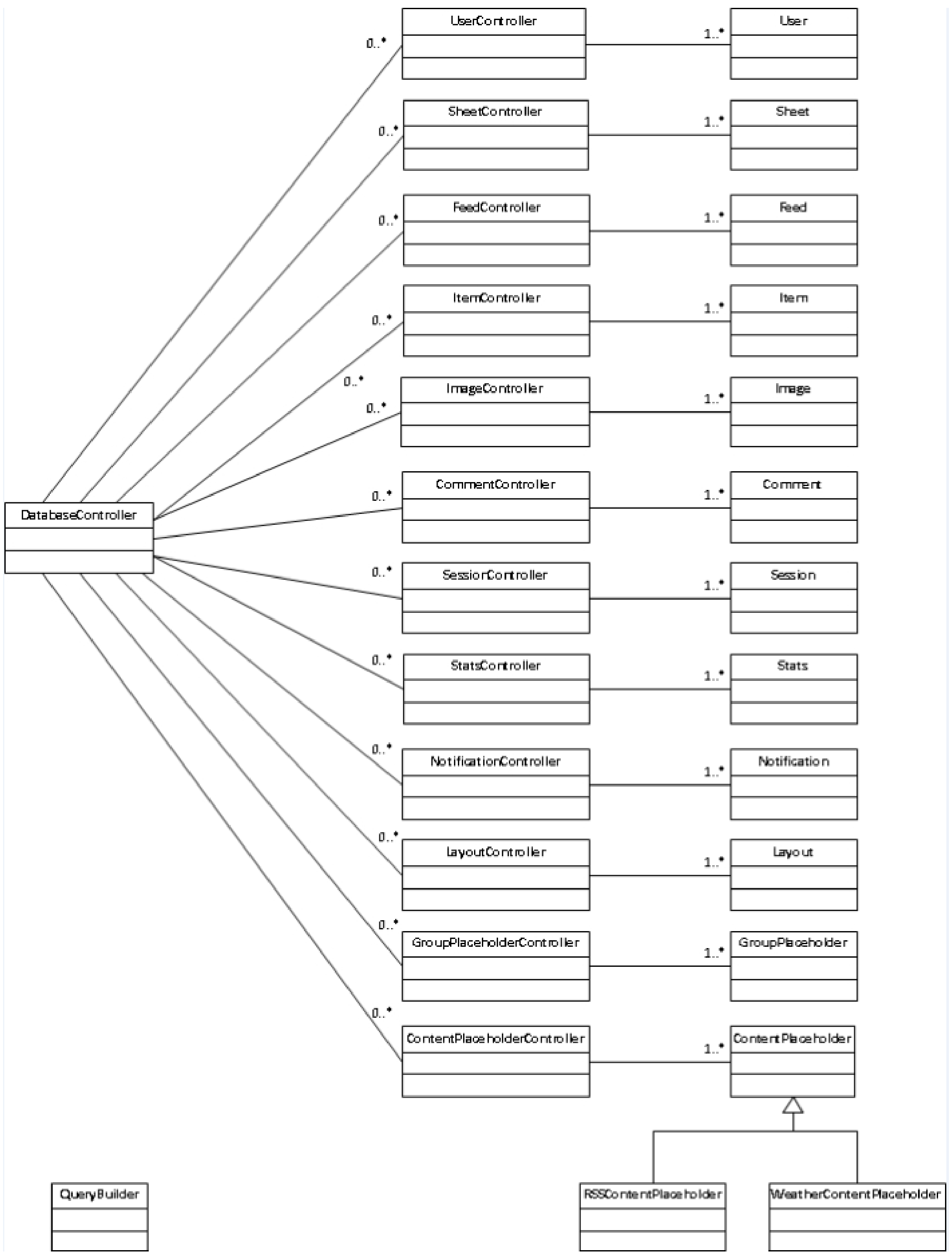
Back-End Exception Hierarchy



Full name of the class	**Brief Description**
nfrd::module::ModuleException	General exception for module
nfrd::config::ConfigException	General exception for config
nfrd::config::IOException	Input/Output exception for config
nfrd::config::ItemNotFound	Sector or attribute not found
nfrd::parser::ParserException	General exception for parse
nfrd::parser::HasNoValue	Has no value exception
nfrd::parser::InvalidSource	Invalid source exception
nfrd::log::LogException	General exception for log
nfrd::log::IOException	Input/Output exception for log

Shared Database Library Class Documentation

Shared Database Library Class Diagram



The shared database library is designed in the model view controller pattern; as such it has the following types of classes:

Entities

These classes are simply structures that represent the tables in the database. They consist of a number of private member variables that relate to the columns in the tables, as well as accessor/mutator methods to operate on these variables.

Full name of the class	Brief Description
User	Represents the users (and administrators) who access the system.
Sheet	Represents a sheet/view which displays the feeds in the system.
Feed	Represents a news (or other content) feed in the system.
Item	Represents a news item or piece of content from a feed
Image	Represents an image for a particular item.
Comment	Represents a comment made by a user on a particular item.
Session	Represents one of the of the currently active user sessions.
Stat	Represents statistics logged by the Back-End.
Notification	Represents the notifications shown to the user.
Layout	Represents the layout of a sheet in terms of rows and columns.
GroupPlaceholder	Represents an area where content placeholders can be placed on a sheet.
ContentPlaceholder	An abstract class, including only common settings for an area where feed content will be displayed.
RSSContentPlaceholder	A sub-class of ContentPlaceholder, representing an area where RSS feed content is displayed.
WeatherContentPlaceholder	A sub-class of ContentPlaceholder, representing an area where weather content is displayed.

Controllers

These classes are the interfaces used by the other sub-systems to interact with the database. They consist of a number of methods which are used to find, modify, delete and create entities. Each controller interacts solely with its related entity class. They return entities (individually or in collections) or responses based upon which of these actions they are performing.

Full name of the class	Brief Description
UserController	Called to create, update, delete or find users. It also includes methods which are used to authenticate and change the user's password.
SheetController	Called to create, update, delete or find sheets.
FeedController	Called to create, update, delete or find feeds.
ItemController	Called to create, update, delete or find items.
ImageController	Called to create, update, delete or find items.
CommentController	Called to create, update, delete or find comments.
SessionController	Called to create, delete or find sessions.
StatController	Called to create, delete or find statistic records.
NotificationController	Called to create, delete or find user notifications.
LayoutController	Called to create, update, delete or find sheet layouts.
GroupPlaceholderController	Called to create, update, delete or find group placeholders.
ContentPlaceholderController	Called to create, update, delete or find content placeholders. Its methods access both standard ContentPlaceholder records, the sub-classes of ContentPlaceholder.
DatabaseController	A Singleton class which represents the connection (or more correctly pool of connections) to the database. It contains methods which perform all database interactions, namely connecting and disconnecting from the database and executing queries. It also contains members that hold basic database information (such as the open connection, DBName, URL, etc).

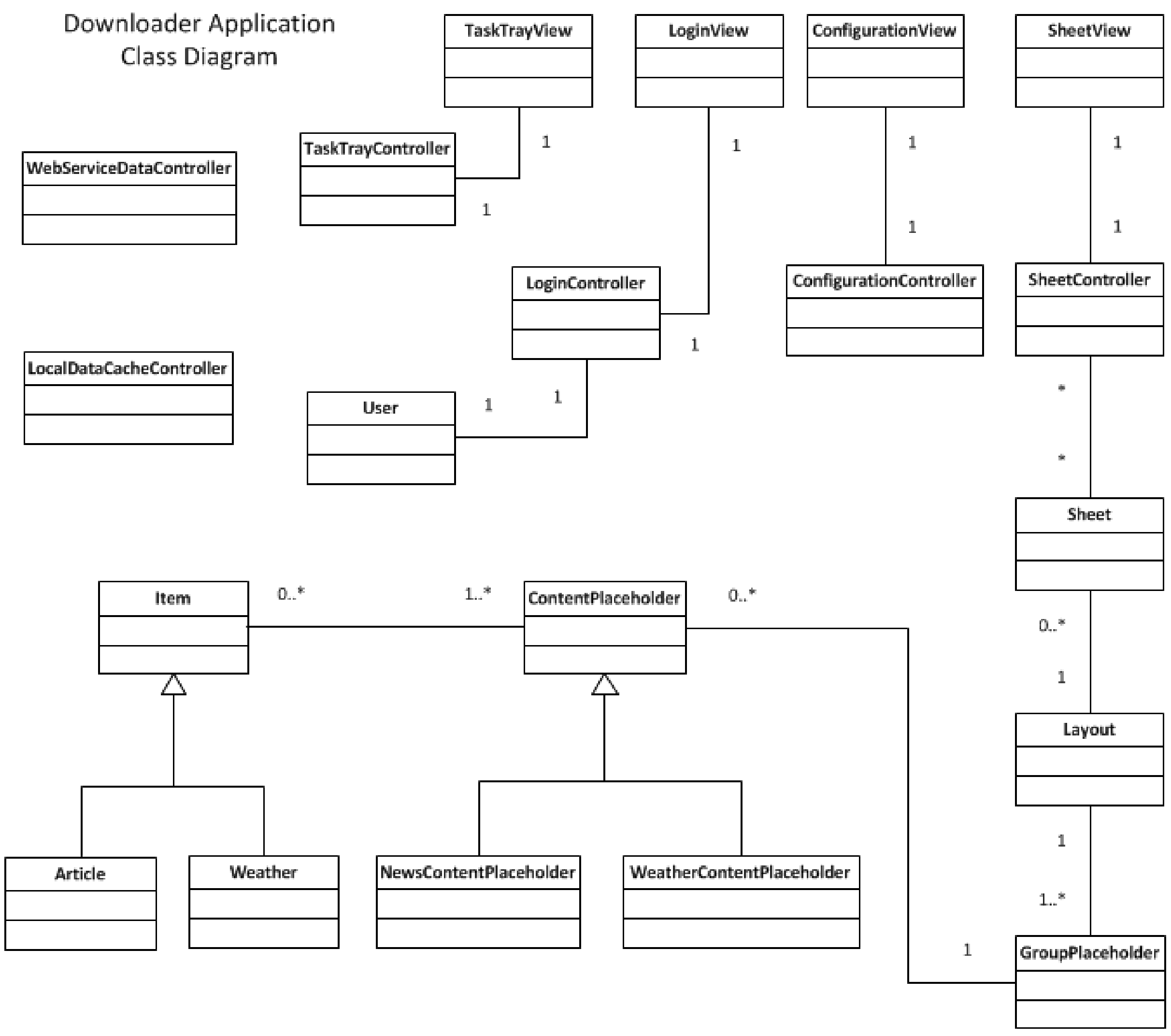
Utilities

These classes are used by the controllers to perform commonly used operations.

Full name of the class	Brief Description
UserController	Called to create, update, delete or find users. It also includes methods which are used to authenticate and change the user's password.
DateTime	Ccalled to create, update, delete or find sheets.

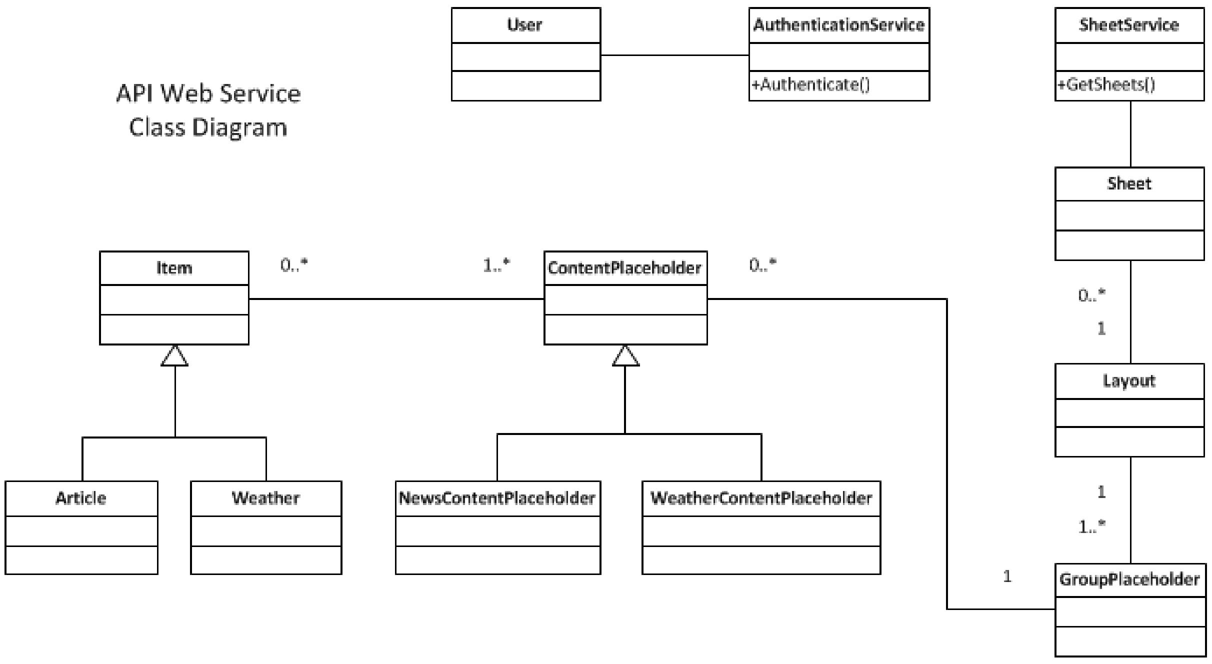
Downloader Application Class Documentation

Downloader Application Class Diagram



Web Service API Class Documentation

Web Service API Class Diagram


API Web Service Class Diagram
User
AuthenticationService
+Authenticate()
SheetService
+GetSheets()
Sheet
Item
0..*
1..*
ContentPlaceholder
0..*
0..*
1
Layout
1
1..*
1
GroupPlaceholder
Article
Weather
NewsContentPlaceholder
WeatherContentPlaceholder