

Internet and Mobile Services

Project report

# **RSS Manager**

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# 1. Project Motivation

This application is designed to allow the user to browse BBC RSS news feed in a convenient way. Currently, the application uses “Technology” section of BBC RSS news feed, but it could be easily change to use different BBC news feed (or perhaps not even BBC), because the structure of the feeds is the same. The user is provided with functions to filter news by category, sort news by similarity to selected news item and store interesting news in mobile phone’s memory. You can get a better understanding of what could be possible uses of application by reading “System functionalities” section.

## 2. System functionalities

The first time RSS feed is accessed, all of the news titles and short descriptions are downloaded and displayed. If the user wants to read whole article, he has a possibility to open selected news item in the mobile phone’s web browser.

One of the major application functionalities is a possibility to store some news item descriptions in mobile phones memory. In this way the user can “mark” all news item descriptions which he finds interesting and read the actual news articles later (even after long time when they are no longer in the RSS news feed).

Two more important application functionalities are news sorting by similarity and filtering by category. Filtering can be used simply to show the news items only of the category the user is interested in. The more interesting is sorting command.

If the user selects sorting command the selected list (either the list of news in RSS feed or the list of locally stored news) is sorted by the similarity to selected news item (this selected news item can also be from any of these two lists). The similarity is computed by comparing the words in news titles and descriptions. Approximate string matching algorithm is used which matches not only exactly equal words, but also the words which differ by several letters (the longer are the words, the more different letters are allowed). Basically, sorting by similarity function is useful if the user has found a news item on the topic that he is interested in and he wants to find some more similar news items.

## 3. Human Computer Interaction

### A. Main Menu

In the Main Menu the user is provided with three options:

- **Browse RSS News List** – go to section B1. RSS news list
- **Browse Store News List** – go to section B2. Store news list
- **Help** – shows short instructions how to use application



Figure 1: Main Menu

## **B1. RSS news list**

The first time RSS News List is accessed, the list is downloaded from the internet (while downloading, waiting screen is shown).

After downloading, the news titles and categories are displayed (the news items are sorted in the same order as in the original RSS feed). If some of the news items in RSS feed are already stored in the Store, these news items are displayed with icon „S“ next to them. Other news items in RSS feed are displayed with icon „R“ next to them.



Figure 2: RSS News List



Figure 3: News filtered by category



Figure 4: News sorted by similarity



Figure 5: News sorted by similarity and filtered by category

The user is provided with the following commands in the menu:

- **View** – displays a detailed news item description (go to section C.Description)
- **Add to Store** – adds the selected news item to the Store. If the news item is already in Store News List then error alert will be shown.
- **Remove from Store** – removes the selected news item from the Store. If the news item is not in Store News List then error alert will be shown.
- **Filter by Category** – displays only those news items from the current list which have the same category as the selected news item
- **Sort RSS** – reorders the news items in the RSS News List by the similarity to the selected news item
- **Sort Store** – reorders the news items in the Store News List by the similarity to the selected news item
- **Open in Browser** – opens the selected news item in the mobile phone's web browser (this closes the application)
- **Reset Filter/Sort** – turns off sorting and filtering and shows initial list (this command is visible only when filtering and/or sorting is activated)

If **Sort RSS** command is selected then the displayed news are simply reordered by the similarity to the previously selected news item. However, if **Sort Store** command is selected then the program navigates to the news list which is stored in the Store and sorts them by the similarity to the previously selected news item in RSS feed. The user is allowed to use filter and sort commands combined one after another.

## **B2. Store news list**

When Store News List is accessed the locally stored news are displayed in the same way as in RSS News List. Obviously, all of the news here will have „S“ icon next to them. The available commands are also the same as in RSS News List. One little difference in behavior of commands is that when user tries to remove news item from the Store News List, he is asked to confirm his action in a confirmation screen (the confirmation screen is not shown in the RSS News List, because there the user can add the same news item immediately after deleting it).



Figure 5: News in the Store News List

### **C. Description**

When the Description window is accessed (either from RSS News List or from Store News List) the detailed description of the news item is displayed. The commands behave in the same way as in the previous screens.



Figure 6: Description

## 4. Diagram of Screen Transitions

Here is the diagram for screen transitions to get a better understanding how application works. Blue lines stand for transitions using sorting commands.

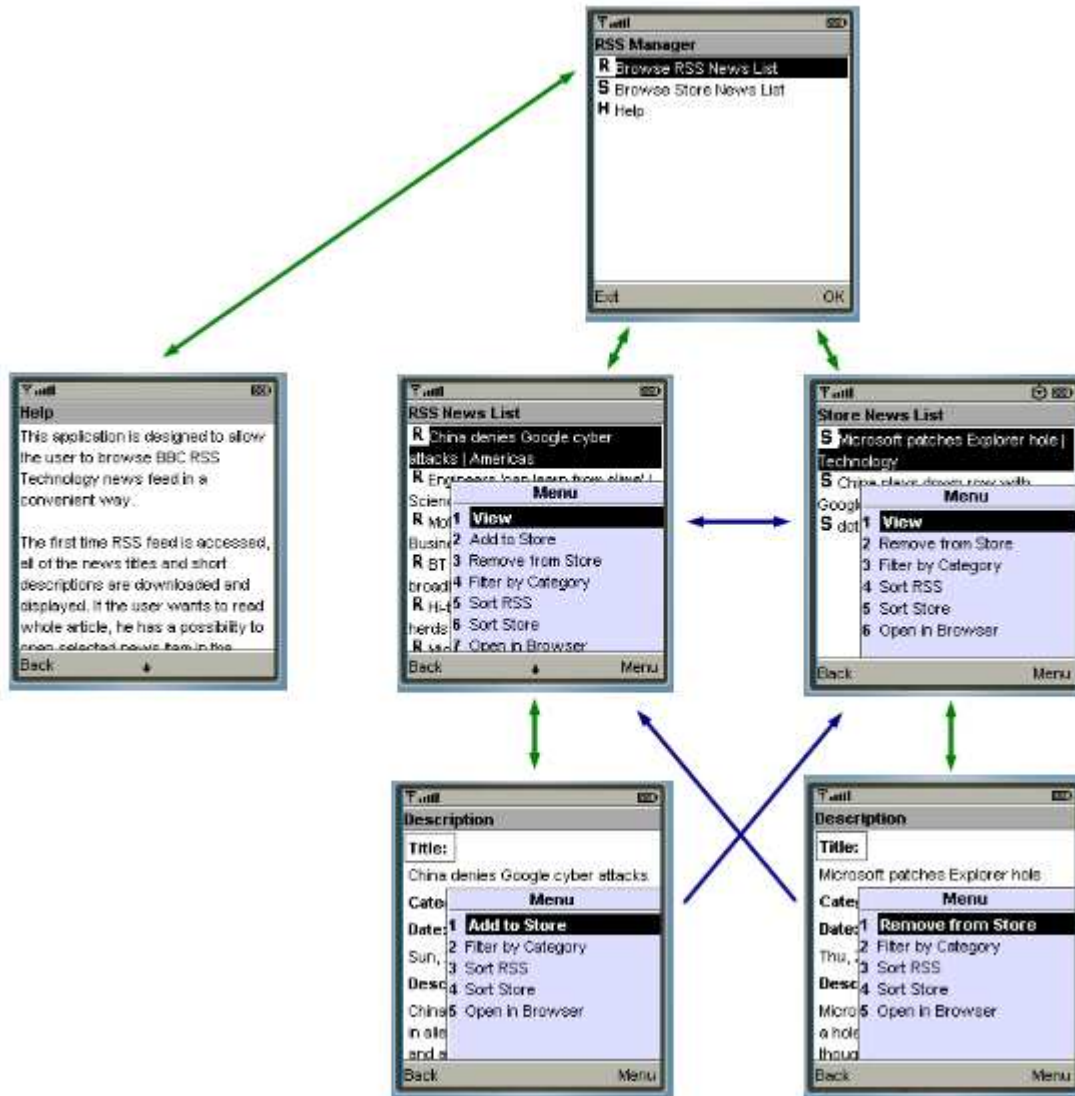


Figure 7: Diagram of Screen Transitions

## 5. Similarity Algorithm

We used this algorithm for computing similarity between news:

```

if (word1.text.length() > 2) {
    int editDistance = levensteinDistance(word1.text, word2.text);
    int allowedDifference = word1.text.length() / 4;
    if (editDistance < allowedDifference) {
        itemDistance += word1.text.length() - editDistance - 2;
    }
}

```

}

Basically, we computed how many words in news texts (titles and descriptions) matches. The words are considered matching if they are:

- Longer than 3 characters (short words are not meaningful in similarity comparison)
- The amount of characters which differ between two words is not more than the length of the word divided by 4

In the beginning we considered only exactly equal words, but later we decided to add string edit distance algorithm (also called Levenshtein algorithm) to match words which are very similar, but not exactly equal (for example, if two long words differ just by one character, there is a big probability that the words have similar meaning). The complexity of the algorithm is  $O(N1*N2)$  where  $N1$  and  $N2$  are lengths of the words. Since the words are usually quite short, after adding this function, the sorting time did not increase a lot (we could not spot any difference in speed).

The amount of points which we added for each match is „ $word1.text.length() - editDistance - 2$ “. We subtracted 2 to give bigger preference for long words (the words considered are longer than 2, so it did not lead to negative numbers). The numbers are finally converted to percents by dividing by the maximum possible similarity score.

## 6. Code Architecture

We provide a table with short descriptions of each class and a diagram of relationship between classes.

Class Name	Description
RSSManagerMidlet	The main class that extends MIDlet that manages forms and handles commands.
RSSDownloader	Downloads the RSS feeds from the Internet, parses using kXML and adds NewsItems to the RSS NewsList.
NewsList	Data class for RSS and Local lists. Stores NewsItems in a RecordStore that is attached to the NewsList.
NewsItem	Data class for the news entity.
SelectedNewsItem	Derivative from NewsItem with the addition to store the indices of RecordStore it is in and List it is displayed in. The indices are used for storing / removing the item in the Store and changing the List that is displayed.
FilterAndComparator	Class that is used by enumeration method of RecordStore. It handles list filtering by the category and sorting by similarity. It includes an implementation of Levenshtein distance algorithm and a distance hash table that is made before sorting to increase the speed of ordering.
NewsConverter	A utility class for creating NewsItems from a text string that can be stored in a RecordStore and vice versa.

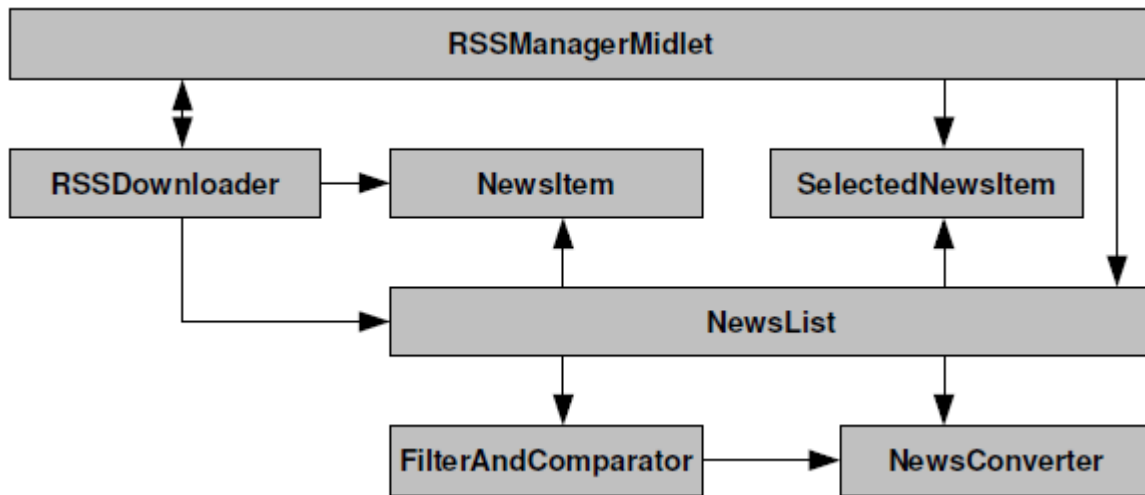


Figure 8: Relationship between classes (any arrow denotes that a class calls a method of another class)

## 7. Technical Problems and Solutions

The problems we encountered and the solutions are the following:

- **Intuitive user interface.** – We tried to make user interface intuitive by creating as simple navigation as possible and adding some information screens for more complicated commands (sorting and filtering). We also, implemented dynamic change of information icons when the user adds/removes news item to/from Store News List.
- **Some commands required a lot of time to execute.** – In order to avoid user interface deadlocks while executing these commands, additional threads were introduced for downloading and parsing the RSS feed and initializing news lists (news list initialization includes sorting and/or filtering and reading from RecordStore). A waiting screen is displayed for the user while threads are running.
- **Long command names did not fit into the screen.** – We solved this problem by making command names as concise as possible. We removed all articles from command names (because they do not carry crucial information) and we renamed some objects (for example, we renamed „Local Store News List“ to „Store“).