

# Eco-Friendly Web Page Printing Add-on for Mozilla Firefox

**'Anil Bharodiya, "Dr. Ajay Parikh**

**'Asst. Prof. (B.C.A.), UCCC & SPBCBA & UACCAIT College, Surat, Gujarat, India**

**"Prof.& Head, Dept. of Comp. Sci., M.D. Samaj Seva Mahavidyalaya, Gujarat Vidyapith, Ahmedabad, Gujarat, India**

## Abstract

Web browser is a software application for retrieving, presenting and traversing information resources on the World Wide Web. At present various desktop web browsers are available such as Netscape Navigator, Internet Explorer, Opera, Safari, Mozilla Firefox, Google Chrome etc. Each of these supports print related functionalities such as print, page setup and print preview. Many times a user needs to print or save only core content of web page other than advertisement or unnecessary content available on the web page without changing in its original content or to save a modified web page in PDF file format. These printer friendly functionalities are not available in Mozilla Firefox. We have analyzed printing related features of aforesaid popular web browsers and developed an Add-on which supports eco-friendly printing functionalities for Mozilla Firefox. The paper explains some basics of the web browser's printing features, architecture of Mozilla Firefox and discussion on developed add-on which supports various print related tasks.

## Keywords

Web Browser, World Wide Web, Add-on, Web Page, PDF.

## I. Introduction

Today, web has become the most used and popular platform for communication [1]. Web browsers attempt to present to user the best presentation they can offer and other options to facilitate better services on the web [2]. The web browser is perhaps the most widely used software application in history and has evolved significantly over the past fifteen years. Users run web browsers on diverse types of hardware, from cell phones and tablet PCs to regular desktop computers [3]. A technological drive from Web 1.0 to Web 3.0, it is challenge for the developers of web browser to provide an efficient web browser having robust and exceptional accessibility features [4].

In these modern days of internet and technology, various web browsers are available such Netscape Navigator, Internet Explorer, Opera, Safari, Mozilla Firefox, Google Chrome etc. End user uses web browser for surfing of different kind of sites like tutorial site, e-commerce site, government portals or do any internet related work. Often, it may happen that a web page which is searched by user contains advertisement or unnecessary content and user wants to save or print only required content of web page. There are many disadvantages if user saves or prints a web page as searched from web like additional load on printing in terms of wastage of ink, paper, power, time and money as well as it requires more external and internal storage space to preserve this documents. Ultimately, it harms the nature.

Solution of above problems is that a web browser should have eco-friendly printing feature. A web browser usually supports three main printing related features such as print, page setup and print preview. A part from these features web browser should support a functionality of web page correction before printing it. Further, a web browser should have a functionality to convert a web page in PDF file format so that it can be used later on. These printer friendly functionalities are not available in Mozilla Firefox [5]. In short, a web browser should provide web accessibility features which can ease tasks of normal person and disabled person [6]. In this paper, we have discussed an eco-friendly printing add-on for Mozilla Firefox. Add-on is one kind of support which performs the task of patch to add more features in web browsers [7, 8]. It supports web page corrections as well as to save corrected or original web page in PDF file format.

## II. Architecture of Mozilla Firefox

Firefox is a product that is released by the Mozilla Foundation. Firefox is written in C/C++ and contains over 2,400 kLOC. The conceptual architecture is similar to most modern web browsers. The application is comprised of several independent components layered together to form a layered architecture. A layered architecture is used to simplify the design and maintainability of the code [9].

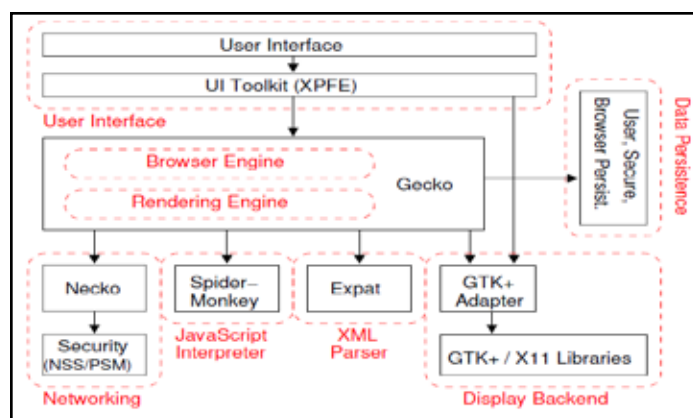


Fig. 1: Architecture of Mozilla Firefox.

In the above figure – 1 User Interface is split over two subsystems, allowing for parts of it to be reused in other applications in the Mozilla suite such as the mail/news client. It is written in XUL and JavaScript. XUL is an XML grammar that provides user interface widgets like buttons, menus, toolbars, trees, etc. User actions are bound to functionality using JavaScript [10]. XUL is mapped onto platform-specific libraries using specially written adapter components. All data persistence is provided by Mozilla's profile mechanism, which stores both high-level data such as bookmarks and low-level data such as a page cache. Mozilla's Rendering Engine performs parsing and layout for HTML and CSS. Browser Engine is an embeddable component that provides a high-level interface for querying and manipulating the Rendering Engine. Networking subsystem provides functionality to handle retrieved URLs using common internet protocols of HTTP and FTP. JavaScript interpreter executes the JavaScript code. Display Backend provides drawing and windowing primitives,

user interface widgets and fonts. This architecture distinguishes Mozilla from other browsers in which the platform-specific display and widget libraries are used directly, and it minimizes the effort required to support multiple, diverse platforms [3].

Mozilla Firefox supports various features to use websites and web products. Since Mozilla Firefox is an open source web browser, if a particular feature is not available, a developer can have scope to develop it in the form of add-on using XUL, JavaScript and CSS. XUL Overlays have been used to attach add-on UI to a XUL document (browser.xul) of Mozilla Firefox at runtime [10]. Since XUL resides in UI layer of architecture, Add-on also resides in UI layer of Mozilla Firefox architecture.

### III. Eco-Friendly Printing Add-On

Mozilla Firefox does not support eco-friendly printing features as discussed in the above section. Authors have developed an add-on for Mozilla Firefox. It enables web user to convert a web page in printer friendly page and to save corrected or original web page in PDF file format.

The design of this add-on includes user interface and coding of the various features given in below figure.

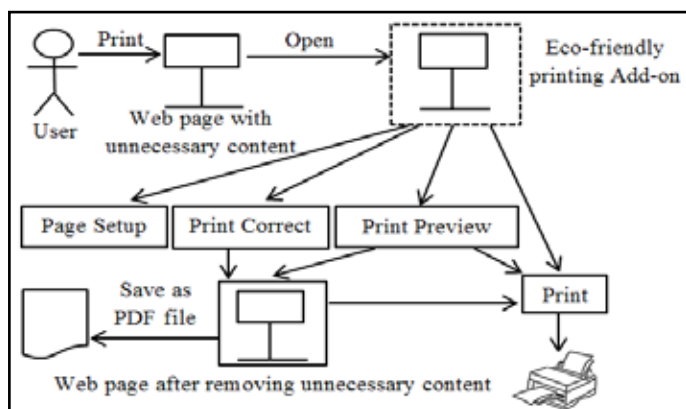


Fig. 2: Eco-friendly printing add-on architectural design.

The developed add-on supports various print related features like print, print preview, print correct and page setup. Print, Print Preview and Page setup features are Mozilla Firefox’s inbuilt features. Print correct feature is the core of this add-on which is used to remove unnecessary contents from web page or to save a modified or original web page in PDF file format.

This add-on is developed through XUL, JavaScript and CSS. The development part of this add-on also includes some inbuilt functions, features and layout style of Mozilla Firefox. Following figure – 3 shows algorithm to convert a web page into eco-friendly printing page.

- Step – 1: Web page with unnecessary content.
- Step – 2: Remove unnecessary content through add-on.
- Step – 3: Option to save corrected web page as PDF file.
- Step – 4: Print corrected web page.

Fig. 3: Steps to use eco-friendly printing add-on.

This add-on provides many advantages for Mozilla Firefox user like decreasing on additional load on printing by removing advertisements and unnecessary contents from web page, feature of saving a web page in PDF file format, it is multilingual, it promotes eco-friendly printing of web page by saving ink, paper,

power, time and money. Since it is an open source, there is a scope for creative developer to extend or modify it. On the contrary, this add-on suffers from limitations such as it only supports to save print content in PDF file format, text editing and coloring are not possible.

### IV. Impact of Eco-Friendly Printing Add-On

The developed add-on for Mozilla Firefox impacts on web page printing task. To check its impact, we have considered a web page having 25% portion of advertisements or unnecessary content horizontally. If this web page is printed through HP LaserJet Printer (Pro P1102w) without add-on, consider, it requires 100 A4 size papers. Per page printing cost on said printer is Re. 1 (assumed), it takes 1 minute to print 18 A4 size papers, power consumption is 370 watts/hour and cartridge capacity is 700 pages [11]. Following statistics given in table – 1 can be derived, if Mozilla Firefox is used without and with add-on to complete this printing task [12]. (Used power consumption formula:  $E_{(kWh/day)} = P_{(w)} * t_{(hr/day)} / 1000_{(W/kW)}$ ).

Table 1: Statistics of eco-friendly printing add-on.

Mozilla Firefox	No. of A4 B/W Pages	Total Cost (/page Re.1)	Time Taken (18 ppm)	Power Consumption 370 watts /h (active)	Cartridge Capacity
Without Add-on	100	100	5.56 mins.	34 watts	700 pages
With Add-on	75	75	4.17 mins.	26 watts	875 pages

It is evident from the above table – 1 that if eco-friendly printing add-on is installed in Mozilla Firefox, then, it decreases usage of paper, cost, time, ink and power consumption and increases cartridge capacity and speed of printing task too. From the above table – 1, we can say that add-on impacts significantly on various printing parameters and it ultimately promotes eco-friendly printing of web page.

Figure – 4 shows a web page from tutorial website containing advertisements and some unnecessary contents highlighted in rectangular boxes. Figure – 5 shows same web page after removing these unnecessary contents by using eco-friendly printing add-on. This way user can utilize this add-on for various tutorial sites, e-commerce sites, governmental portals, sites of educational/ industrial institutes etc.



Fig. 4: Web page with unnecessary content.



Fig. 5: Web page after removing unnecessary content.

Technology change and user taste are continuous process. So, there is always scope for developers to extend this add-on to overcome its limitations and to develop new add-ons to add more features in Mozilla Firefox.

### V. Review of Eco-Friendly Printing Add-On

Reviews about use of this add-on have also been collected from a web developer, 7 teachers, 1 clerical person and 12 students. Conclusion of their reviews was that this add-on is very useful and handy for web page printing.

### VI. Conclusion

Eco-friendly printing add-on adds various printer friendly functionalities in the Mozilla Firefox web browser. It is very handy for the user to do print related corrections in web page before taking final print out. Authors have tried to minimize the efforts of Mozilla Firefox users by providing an add-on which supports print out related tasks such as correction of web page before final print out, print, page setup, print preview, convert and save original or corrected web page in PDF file format. Key advantages of this add-on are it is open source and eco-friendly because it saves printing ink and papers by removing unnecessary part(s) such as advertisements from web page. This type of add-on can be downloaded and installed by various commercial or governmental organizations, educational institutes, corporate offices or personal users for their routine printing related tasks. This add-on is a path

to develop more add-ons or plugins for eco-friendly web page printing purpose.

### References

- [1] Marin Silic (2010). Security Vulnerabilities in Modern Web Browser Architecture. MIPRO, 2010 Proceedings of the 33rd International Convention, 1240 – 1245. Retrieved from [https://www.fer.unizg.hr/\\_download/repository/MarinSilic.pdf](https://www.fer.unizg.hr/_download/repository/MarinSilic.pdf)
- [2] Souley, B., & Sambo, A. S. A Comparative Performance Analysis of Popular Internet Browsers in Current Web Applications. Retrieved from <http://www.ajol.info/index.php/wajiar/article/viewFile/86893/76683> (16th Sept., 2014).
- [3] Grosskurth, A., & Godfrey, M.W. A Reference Architecture for Web Browsers. Retrieved from <http://grosskurth.ca/papers/browser-refarch.pdf>
- [4] Dr K P Singh, Bebi & Dipti Gulati (2011, June). Technological March from Web 1.0 to Web 3.0: A Comparative Study. Library Herald, 49 (2), 146 – 157.
- [5] <https://support.mozilla.org/en-US/kb/accessibility-features-firefox-make-firefox-and-we> (Retrieved on: 6th June, 2014).
- [6] Bradbard, A.D., & Peters C. (2010, January). Web Accessibility Theory and Practice: An Introduction for University Faculty. The Journal of Educators Online, 7 (1), 2 – 9. Retrieved from <http://www.thejeo.com/Archives/Volume7Number1/BradbardandPeterspaper.pdf> (16th Sept., 2014).
- [7] <https://addons.mozilla.org/en-US/faq> (Retrieved on: 6th June, 2014).
- [8] <https://developer.chrome.com/extensions> (Retrieved on: 6th June, 2014).
- [9] <http://people.mozilla.org/~roc/Samsung/MozillaArchitectures.pdf> (Retrieved on: 17th Nov., 2014).
- [10] [https://developer.mozilla.org/en/docs/Building\\_an\\_Extension](https://developer.mozilla.org/en/docs/Building_an_Extension) (Retrieved on: 17th Nov., 2014).
- [11] <http://store.hp.com/UKStore/Merch/Product.aspx?id=CE658A&opt=B19&sel=BPRN#merch-tech-specs> (Retrieved on: 20th Nov., 2014).
- [12] <http://www.rapidtables.com/calc/electric/energy-consumption-calculator.htm> (Retrieved on: 20th Nov., 2014).