

# Enhancing Web Surfing Experience in Conditions of Slow And Intermittent Internet Connection

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The Web became a mass media allowing its users to quickly and comfortably search for information. It provides a way to acquire knowledge from various study fields and allows people to stay in touch with the current situation in the world. Thanks to the Web, its users may express their thoughts and discuss their problems with people around the world without the need to know them personally or travel long distances.

Despite of the advancements in information and telecommunication technologies, slow and intermittent Internet connection is still a serious issue in many places of the World and is most visible in developing countries. Web surfers from these countries are extremely patient as there is not much they can do to deal with unexpected cut-offs, slow and incomplete downloads of webpages [1], all preventing the Web to become a really useful tool for dealing with everyday problems.

There are several problems in utilization of available connection. Even though the Internet connection is often shared among several users, it does not take into account repetitive accesses to the same resources. The same website or YouTube video is being downloaded again and again by different users even though it has not changed since last visit. At the same time, the browsing session is usually performed in subsequent peaks. The Internet link is idle most of the time when the user reads the content of a downloaded website or during the night and is overloaded when the user decides to access another website. There are almost no “background” jobs taking advantage of slow and intermittent (but flat-rate) link [1].

Another problem is that users surf on their own. However, a group of users, e.g., students during computer class, share interests and information needs and could take advantage of collaborative surfing to achieve their goals more quickly and efficiently. If a valuable resource is identified by a group member, others can be notified about it.

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We propose OwNet solution to enhance Web surfing experience directly and indirectly, mainly in conditions of slow and intermittent Internet connection.

We took direct approach for saving connection by caching web objects to save bandwidth and reduce latency for fetching requested web objects [2]. We also implemented our own caching and cache invalidation algorithms. Being aware that our application will be used on older computers, we tried to optimize it. We also proposed a combination of existing prefetching approaches to get an algorithm tailored to our needs. Pro-active downloading and caching not yet requested web objects of user's interest may result in user's perception of having a faster Internet connection.

We took indirect approach by applying collaborative tools in order to eliminate the problem with users of the same group browsing individually. By recommending and rating interesting websites they can help others find useful information faster.

OwNet solution consists of three modules which are individually independent but they complement one another:

- Local client proxy application responsible for handling requests from client applications, e.g., Internet browser. Users use their Internet browser to access the Web in the same way as they would without using it.
- Local server proxy application serves local clients applications, preferably within a same organization, e.g., in a school. This enables caching of Web content within an organization, prefetching and advantages of collaborative tools
- Central service as a means to find out which cached objects are outdated, reduces the load on local proxy servers and their Internet connection. It ensures that cached objects are updated only if they were changed on the Internet

We contacted few Slovak NGOs that operate in rural areas of Africa to discuss possibilities of OwNet deployment in these places. We are currently in progress of deploying OwNet to computer lab in Nanyuki High School in Kenya. In addition, we have worked to deploy OwNet to Slovak schools, which can also take advantage of its caching and collaborative features.

We believe that the Internet is an important source of information and a crucial part of modern education. OwNet helps people with slow or intermittent connections to the Internet make better use of the information that it provides.

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## References

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