

A
Seminar report
on

Freenet

Submitted in partial fulfillment of the requirement for the award of degree
of Bachelor of Technology in Computer Science

SUBMITTED TO:

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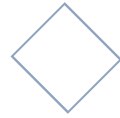
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Preface

I have made this report file on the topic **Freenet**, I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude towho assisting me throughout the preparation of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.



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Acknowledgement

I would like to thank respected Mr. and Mr.for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a seminar report. It helped me a lot to realize of what we study for.

Secondly, I would like to thank my parents who patiently helped me as i went through my work and helped to modify and eliminate some of the irrelevant or un-necessary stuffs.

Thirdly, I would like to thank my friends who helped me to make my work more organized and well-stacked till the end.

Next, I would thank Microsoft for developing such a wonderful tool like MS Word. It helped my work a lot to remain error-free.

Last but clearly not the least, I would thank The Almighty for giving me strength to complete my report on time.

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Introduction

Networked computer systems are rapidly growing in importance as the medium of choice for the storage and exchange of information.

However, current systems afford little privacy to their users, and typically store any given data item in only one or a few fixed places, creating a central point of failure.

Because of a continued desire among individuals to protect the privacy of their authorship or readership of various types of sensitive information, and the undesirability of central points of failure which can be attacked by opponents wishing to remove data from the system or simply overloaded by too much interest, systems offering greater security and reliability are needed.

Free net is being developed as a distributed information storage and retrieval system designed to address these concerns of privacy and availability. The system operates as a location-independent distributed file system across many individual computers that allow files to be inserted, stored, and requested anonymously.

Definition

Freenet is a key-based distributed file system with the goal of providing anonymous access and publishing of information.

Ian Clarke ,Freenet's creator, began the project with the goal of preserving free speech on the Internet and to prevent censorship.

Why is Freenet interesting?

Freenet does not have any form of centralized control or administration. It will be virtually impossible to forcibly remove a piece of information from Freenet. Both authors and readers of information stored on this system may remain anonymous if they wish.

Information will be distributed throughout the Freenet network in such a way that it is difficult to determine where information is being stored. Anyone can publish information. They don't need to buy a domain name or even a permanent Internet connection.

Availability of information will increase in proportion to the demand for that information. Information will move from parts of the Internet where it is in low demand to areas where demand is greater.

Basics

Who should use free net?

Firstly, anyone who believes that free net's core goals of anonymity and censorship-resistance are important to them.

This includes all manner of dissidents and whistle-blowers, plus anyone who is concerned about how continual monitoring by governments and marketing organizations erodes individual privacy rights.

This includes people who don't personally take advantage of the anonymity; the more users there are, the stronger the anonymity becomes.

Secondarily, people who wish to take advantage of free net's performance/scalability characteristics, such as distributing free content to large numbers of users.

Who should not use free net?

People for who free net's design goals and strengths - notably anonymity - are less important than its "non-goals" and omissions. Lawyers and archivists would probably find free net unsuitable for their needs, for example, because free net lacks data permanence and that is an important feature for those audiences.

Similarly, people whose security interests revolve around access control and audit ability rather than anonymity might find free net's security model inconvenient to work with.

Design goals

1. Anonymity for both producers and consumers of information
2. Deniability for stores of information
3. Resistance to attempts by third parties to deny access to information
4. Efficient dynamic storage and routing of information
5. Decentralization of all network functions

The system is designed to respond adaptively to usage patterns, transparently moving, replicating, and deleting files as necessary to provide efficient service without resorting to broadcast searches or centralized location indexes.

It is not intended to guarantee permanent file storage, although it is hoped that a sufficient number of nodes will join with enough storage capacity that most files will be able to remain indefinitely.

In addition, the system operates at the application layer and assumes the existence of a secure transport layer, although it is transport-independent. It does not seek to provide anonymity for general network usage, only for Freenet file transactions.

Features

Freenet stores files. Each file is identified by a key. Whenever you want to retrieve a file, you give Freenet the key, and Freenet will hopefully give you the file contents. Keys are currently not updatable, that is, you cannot change the contents of the file once it's been inserted.

Since the Freenet key-space storage mechanism does not focus on any one content type, including what is legally considered intellectual property, any sort of information can be stored in the system - images, movies, HTML, and so on. The current Freenet implementation is Java based and runs on Windows, Linux, Macintosh, and Solaris. Compared to the majority of peer-to-peer applications, Freenet is very robust but can sometimes be intimidating to the average user.

Freenet is also versatile enough to support many other applications running through it. Frost (Frost is a well-maintained and popular message board system for Freenet. It is very popular in the area of file sharing and is the most widely used Freenet messaging application. Frost is written in Java.) and FMB are two messaging and file sharing solutions, supporting anonymous communications. While Freenet provides an HTTP interface for browsing freesites, it is not a proxy for the World Wide Web; Freenet can only be used to access content that has been previously inserted into the Freenet network. In this way, it is more similar to filesharing applications than to proxy software like Tor.

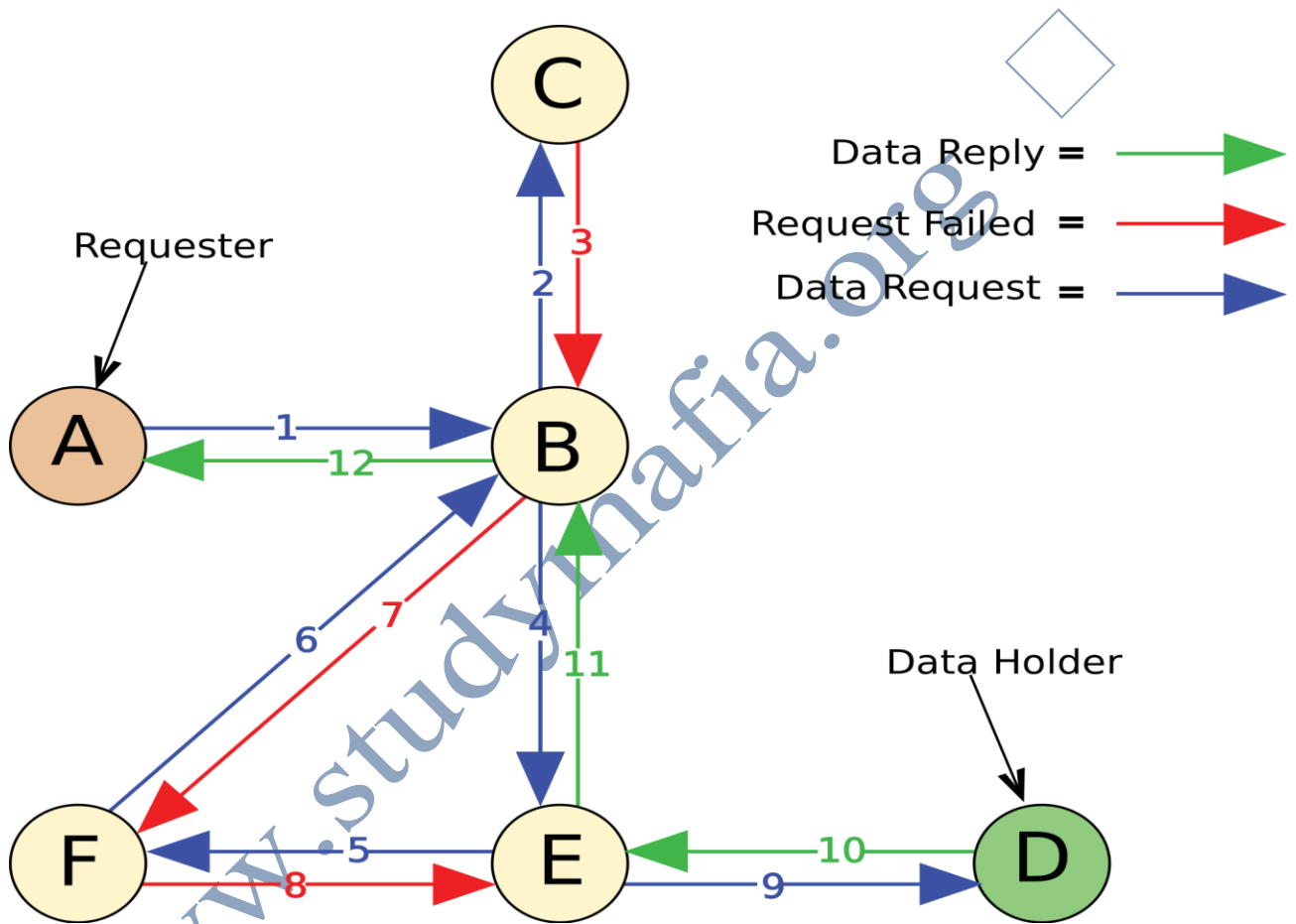
Freenet is substantially different than other P2P applications since users do not simply share and download files. Freenet attempts to protect the anonymity of both people inserting data into the network (uploading) and those retrieving data from the network (downloading). Unlike file sharing systems, there is no need for the uploader to remain on the network after uploading a file or group of files.

Instead, during the upload process, the files are broken into chunks and stored on a variety of other computers on the network. When downloading, those chunks are found and reassembled. Every node on the Freenet network contributes storage space to hold files, and bandwidth that it uses to route requests from its peers. With Freenet files are routed through random users producing a hive of downloads.

Freenet attempts to give a sending node plausible deniability by hiding the true contents of a file from the sending node. Freenet nodes may also drop pieces of information that are least-requested - ensuring that the most popular documents stay on the network.

FREENET MESSAGE PROTOCOL

Message Type and Format



All messages contain four main fields

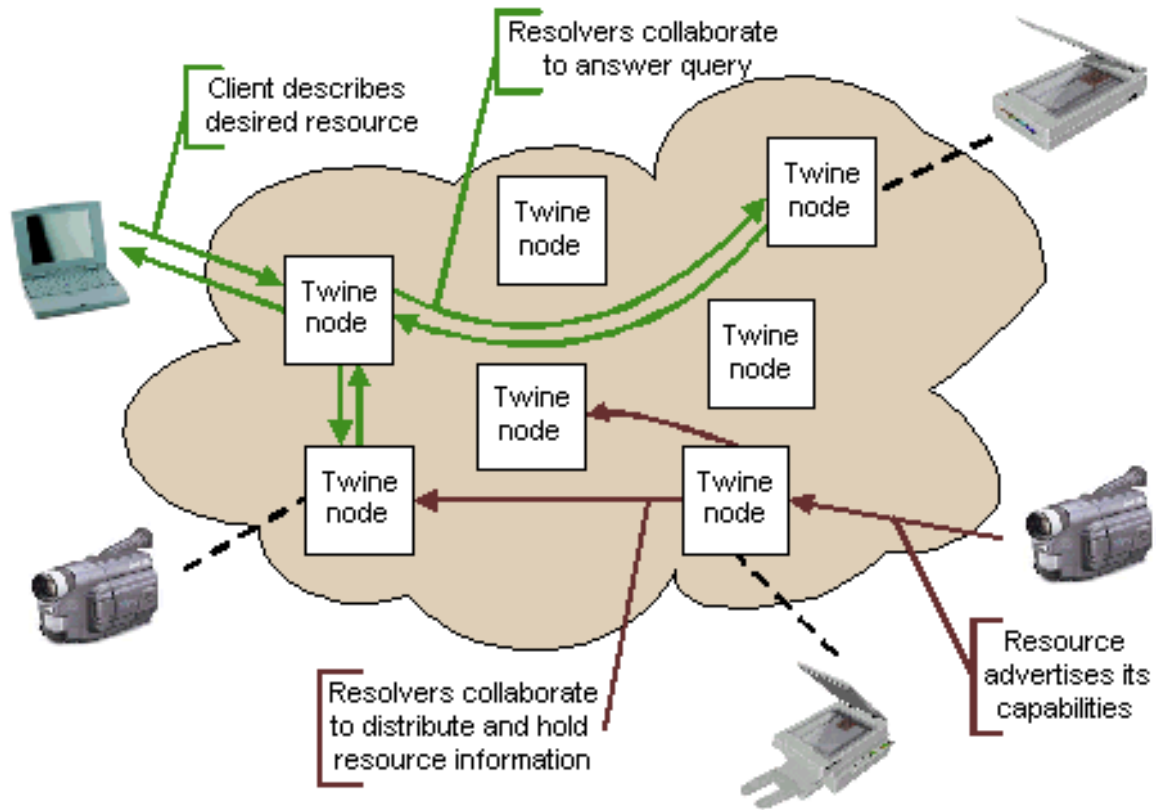
- ID: Unique 64bit Integer
- Source: Address of source node
- Dest: Address of dest node
- HTL: Hops to live count

Message Types

- DataRequest: Request for data corresponding to provided key
- DataReply: Reply with data contained under specified key
- DataInsert: Provides data to be inserted to network and key to insert it under
- RequestFailed: Message passed upward to requesting nodes that a search for a specified key has failed. RequestFailed messages are backtracking so that they may eventually reach the source of the search.

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Free net Architecture



Free net is implemented as an adaptive peer-to-peer network of nodes that query one another to store and retrieve data files, which are named by location-independent keys. Each node maintains its own local data store which it makes available to the network for reading and writing, as well as a dynamic routing table containing addresses of other nodes and the keys that they are thought to hold.

It is intended that most users of the system will run nodes, both to provide security guarantees against inadvertently using a hostile foreign node and to increase the storage capacity available to the network as a whole.

The system can be regarded as a cooperative distributed file system incorporating location independence and transparent lazy replication. Free net enables users to share unused disk space being directly useful to users themselves, acting as an extension to their own hard drives.

The basic model is that requests for keys are passed along from node to node through a chain of proxy requests in which each node makes a local decision about where to send the request next, in the style of IP (Internet Protocol) routing. Depending on the key requested, routes will vary.

The routing algorithms for storing and retrieving data described in the following sections are designed to adaptively adjust routes over time to provide efficient performance while using only local, rather than global, knowledge.

This is necessary since nodes only have knowledge of their immediate upstream and downstream neighbors in the proxy chain, to maintain privacy.

Each request is given a hops-to-live limit, analogous to IP's time-to-live, which is decremented at each node to prevent infinite chains. Each request is also assigned a pseudo-unique random identifier, so that nodes can prevent loops by rejecting requests they have seen before.

When this happens, the immediately preceding node simply chooses a different node to forward to. This process continues until the request is either satisfied or exceeds its hops-to-live limit. Then the success or failure result is passed back up the chain to the sending node.

No node is privileged over any other node, so no hierarchy or central point of failure exists. Joining the network is simply a matter of first discovering the address of one or more existing nodes through out-of-band means, then starting to send messages.

ADVANTAGES

1. The way Freenet's architecture is designed makes it inherently good at some things, and inherently bad at others. However, free net's design has a few inherent advantages over other networks.

Because the data is inserted, it will be spread over a large number of hosts.

2. Each node has a data store, all nodes are contributing to the speed of downloads even if the node operator is not publishing any content. Freenet also requires nodes to have higher uptimes than most networks, so data is more likely to be available.

This means that you can download from many computers even if the file is unpopular, and the total bandwidth is not directly limited by the number of people downloading it or sharing it.

3. The Free net design has the potential to outperform the venerable Bit Torrent. When you request a file it downloads it in many chunks, each of which will likely come from a different computer, it can allow very fast downloads for big (710MB+) files.

DISADVANTAGES

1. Free net has inherently high latency. This means it will never be suitable for playing real-time games or instant messaging.
2. Apart from the Controversy regarding the content on free net, there has also been criticism on the handling of the free net project. Most notably, this is the case for the development process as well as for human resource management, which has lead to countless delays and, Poor development decisions.
3. The security features inherent to Free net make detailed performance analysis (including things as simple as determining the size of the network) difficult to do accurately. As a result, the real-world scalability of free net has not been thoroughly tested.
4. A poor effort in pooling human resources, especially of the part of the founder, has little to do with the novelty. Bad decisions, according to the criticism, involve areas of financial transparency, refusal of implementing user-friendly tools (like a client-sided search engine), the neglect of creating updatable persistent keys, the poor handling of interested parties
(Especially if they are non-coders) who want to help with the project, the refusal to adopt parts of other anonymous networks, code, or layers the decision to go for (and to stick with) a poorly performing routing- mechanism in the 0.5 version (NGR), the decision in The latest version to go for a dark net (and the privacy and load-balancing consequences), etc.
5. Some also have a criticism towards the used programming language (Java) because of the fact it is not a real FOSS language (Suns' Java), or because Java has the reputation to slow down the computer.

CONCLUSION

This scheme keeps information anonymous and is highly scalable. Provides effective means of storage and retrieval. More rigorous tests with many more nodes and improvements to the basic protocol are required.

New files tend to end up near files with similar keys enabling efficiency. New nodes can inform the network of their existence. An attacker trying to insert a corrupted or empty file under the same key will actually spread the real file further. The Free Net was designed to evade censorship for good, and to allow stories to be told from beneath any tyranny that does not totally prohibit computer systems and the internet.

Free Net is truly decentralized, offering total anonymity and relative intractability. Properly developed, Free Net could become the bane of most governments on the planet - a system that truly cannot be controlled or subverted.

Free Net on the other hand, would be a far more difficult fastness to assail. Its popularity would increase greatly- but right now, it has a serious image problem and leaves a bad impression.

Reference

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