

Computers and Media: P2P and Business Models

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Agenda

- difference between client-server and peer-to-peer technology
- business models used on the Internet

Peer to Peer Technology

THE INTERNET

Peer to Peer

Most Internet services are based on the client-server model

There is a server that contains the information, multiple clients connect to it to receive information

The server is the central resource, stores all of the information

Server Model



Server Model

This architecture encourages broadcast, the central server has all the content, sent to the clients on request

Clients have no content, they only display the information sent by the server

The server controls the interaction, the client plays a more passive role

Peer to Peer

In the peer to peer model there is no central server, or it plays a minimal role, establishes the initial connection

The clients are directly connected together and share information

More of a two way flow of information, no centralized coordination, no special nodes in the system

Peer to Peer Model



Peer to Peer Model

More of a communication model

One node doesn't have control over the content, no monopoly on content

All the nodes contribute to the content, content can be distributed over multiple nodes

Applications tend to concentrate on communications, tend to be real time and interactive

How is it Used?

The most high profile use of peer to peer networks is *file sharing*, originated with *Napster*, but there are other applications:

- Resource sharing
- Communication
- Privacy and censorship



File Sharing History

Napster allowed people to exchange MP3 files, share their music files with others

Each user had a library of music files that they could share

Problem was finding who had what file

Napster used a model with a (central) server that maintained a list of who had which files, basically acted like a search engine

Napster Model

To find a file, send a message to the server

Server responds with list of people with the files

Connect to one of these computers, directly transfer the file from that computer

Napster server never stored any MP3 files, just served as a directory or search engine

Napster Legal Issues

Napster system had two benefits:

- no storage of MP3 files meant they were not directly guilty of copyright infringement
- did not need all of the disk space to store all the files

Napster still had major legal problems, but formed the model for future systems

Legal case: provided the means that allowed people to pirate media so a partner in the crime

Early File Sharing

Napster wasn't the first file sharing system, Usenet started in 1979, used for both messaging and file sharing

Based on newsgroups, each group is a sequence of messages on similar topics

Newsgroups forms a hierarchy, but rarely more than 3 or 4 levels

Users could post either messages or files to a newsgroup

Newsgroups

New newsgroups are formed by a democratic process

Group is proposed and anyone with an email account can vote on its creation

If vote passed, newsgroup is created

In the *alt* hierarchy anyone can create a new group, a form of organized anarchy



Usenet

Usenet has no central server, no central storage

Every system on Usenet exchanges messages with the systems it is directly connected to, messages spread over Usenet

Message header ensures messages aren't sent back to systems that already have them

Torrents

Torrents get around one of Napster's problems, the central file directory

There is a distributed list of 'trackers' which dynamically know who has what parts of files

Each tracker maintains list of clients it knows about, this list can change dynamically

Torrents

Popular for media downloads (50-70% of internet traffic)

Used for 'legitimate' purposes also

• Facebook and Twitter propagate data changes to servers using torrents

Schulz, Hendrik; Klaus Mochalski (2009). <u>"Internet Study 2008/2009"</u>. Leipzig, Germany: ipoque. Retrieved 3 Oct 2011.

Napster

The music industry took Napster to court, thought this would stop illegal file sharing

Was this successful? – No

One of the record companies ended up buying Napster

Napster was a single point for all file sharing, easy to trace people who share

The next generation had no single point, much harder to trace file sharing

Napster

The person who shares a file amongst a small group of friends isn't a problem, it will probably help sales

Track the number of times a file is shared, use it to measure popularity, use it in advertising

Want to stop people who share large number of files with everyone, this is now much harder to trace, with Napster this was very easy

Napster

Now the media industry has to go after individuals and hope they find one doing a lot of file sharing

This has generated a lot of bad publicity, take a kid to court who has shared an MP3 with a couple of friends

Question: Would it be better to work with Napster?

Resource Sharing

Can share more than files, can also share computer time

Most of the time home computers and office computers aren't used, they are idle, could be used for other purposes

This is the basic idea behind the SETI@home program and similar projects



qcn version 1.00 [workunit: qcnwu_1000008]



Left Mouse & Drag to Rotate Ctrl+Left or Rt Mouse & Drag to Zoom Mouse on (Red) Quake to Select Shift+Mouse for USGS Website Data Press 'A' to toggle auto-rotation Press 'E' to toggle earth map image

Press 'Q' to return to seismic sensor view Selected Earthquake # 54 of 208:

Magnitude: 4.0 Lat/Long: 34.155, -116.982 Depth (km): 10.20 Time (UTC): 2007/12/19 12:14:09 Southern California

Jesse Lawrence Stanford University CPU Time: 79.329822 sec



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SETI

Search for Extra Terrestrial Intelligence

Based on recording signals from radio telescopes and then trying to find intelligence in them, some form of communications

Requires very large amounts of computation, which was not available to the researchers in this project

Resource Sharing

SETI@home uses home computers to process the data

Home computer requests a small part of the data, analyzes the data, and sends the results back to a central site, it then repeats the process

Large network of home computers is more powerful than the largest computers, and its free

Resource Sharing

Possible model for funding network services, or even pay for network access

Provide a few hours of computing time in exchange for a service, for example music or video downloads

Some large computations are commercially important, companies will pay for computing time

Instant messaging and similar systems provide a form of peer to peer communications

• Skype uses this model

Most of these systems are at least partially server based, but they support communications between two or more clients

In real time

they can be peer to peer

Why do they need a server?

- Need to know how to contact other users, can roam between computers
- need to know who is online
- store messages for users who aren't currently online

Except for last point, the server only plays a rather minor role

Without message storage, server only needs to know who is connected and how they can be contacted

This could be distributed in the same way as BitTorrent

Most instant messaging systems are commercial:

- server based, can keep track of users, charging is possible
- proprietary protocols, can only talk to people on the same system, can't send messages between systems

Support animation and a range of icons

Jabber: Standard Protocol for IM

Jabber: Open source protocol for instant messaging

Originally developed as a bridge between other instant messaging systems

Jabber can support other media, such as sound and video

Business Models

THE INTERNET

Business Models

How do people make money on internet services?

Does advertising make sense for the Internet?

Problems with Advertising

Software to remove adverts, not sure that user ever sees them

Developing a negative image, too much will chase users away

Hard to measure number of viewers, standard charging mechanism for adverts

How do local advertisers fit into the picture?

Business Models

Click-through advertising

Sponsorship

Subscription

Donations

Retailing

Sell Technology

Click Through

An advertisement and link to another website, get paid each time a user follows the link

- works for popular sites
- E.g. Google "AdWords"



Make Money Canada \$40/day You won't get rich, but we do pay. Free survey dashboard makes it easy www.cashbackresearch.com/Canada

AdSense Publishers Can Increase Revenue by Up to 50% with AdMedia Market. No setup fees. www.AdMedia.com

Make Money Online Surveys

Make Up To \$150 In One Hour? Free? Get Paid Taking Surveys (Yes, Free) SurveyMoneyMachines.com/ca





Stuff You would Know Astonishing answers from Josh and Chuck TAKE THE QUIZ



Google Adsense



Sponsorship

Have a small number of large companies sponsor the web site, and have minimal advertising for the sponsors

Rarely used

This work best with non-business oriented websites, such as charities or public services



Subscription

Each viewer pays a certain amount per year, same as magazines

This has been used successfully by some newspaper websites and websites that provide important information

Can divide website into free and paid parts, free part draws customers, hopefully a significant number will become paid subscribers

The New York Times

Unrivaled coverage. Unlimited access.

Get a Times Digital Subscription, just 99¢ for your first 4 weeks.



Donations

Donations and annual appeals, has worked well for public broadcasting (traditional media) in North America

Does not work well for commercial websites



Retailing

Add a store to the website, sell specialized merchandise, website T-shirts

Amazon and others can provide the technology for the retail part of the website



Sell Technology

A final approach is to sell the technology used to develop the website

In other words the website is an advertisement for the technology that you are developing

This has been used successfully by some companies, particularly web design companies



Summary

Today we reviewed:

Peer-to-peer and Business models of the internet