平成16年度　大学院博士(前期)課程入学者選抜学力試験

小　論　文

［90分］

注 意 事 項

1. 試験開始の合図があるまで，この問題冊子を開かないでください.
2. 問題は1ページから4ページにあります．ページ番号のついていない紙は下書き用紙です.
3. 解答用紙は3枚に分かれているので，すべての解答用紙の所定欄に受験番号と氏名をはっきりと記入してください.
4. 計算または下書きに用いる用紙が3枚，解答用紙と一緒にあります.
5. 試験中に問題冊子の印刷不明瞭，ページの落丁・乱丁および解答用紙の汚れ等に気がついた場合は，静かに手を上げて監督員に知らせてください.
6. 試験終了後，問題冊子および下書き用紙は持ち帰ってください.
7. 設問ごとに配点が記されています.

I 次の記事は，コンピュータ同士をネットワーク上で直接接続して，互いに持つ情報をやり取りする方式である P2P(peer-to-peer) と呼ばれる通信形式について述べたものである．この記事を読み，以下の問いに答えよ．とくに指示がない場合は，問いには日本語で答えよ．（配点 100 点）

Napster is the pioneer of a technology known as peer-to-peer networking, or P2P for short. The core idea of P2P is to allow individual computers to communicate directly over the Internet. By bypassing central servers, the technology promises to transform the way people use the Net. In the process, it could destroy the ability of anyone—including corporations and governments—to control what happens in cyberspace.

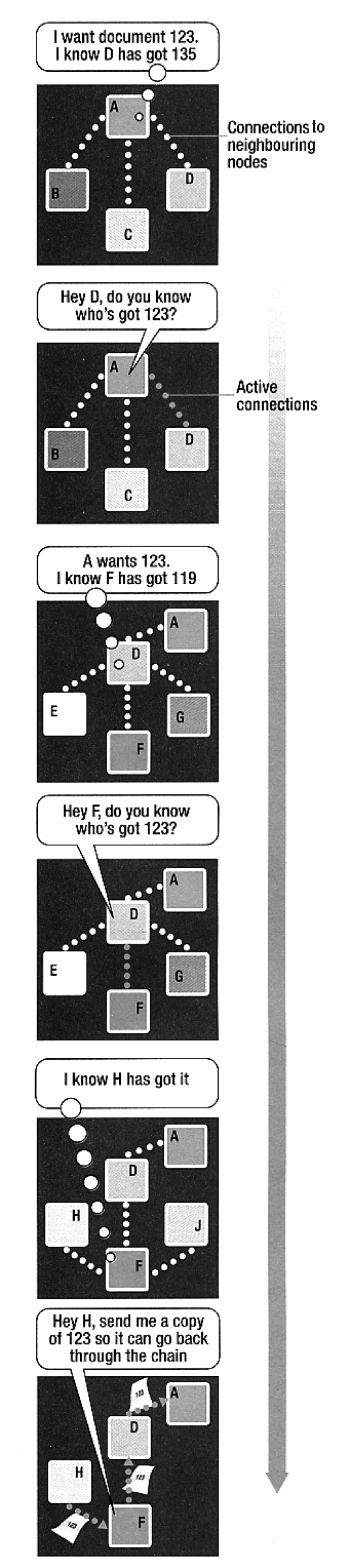
Napster's winning idea was to give P2P to the masses. It figured out that it didn't have to store everything itself. Instead, it acted like a dating agency, bringing music fans—and their MP3 collections—together. Napster provided members with an index of all the music stored on other members' computers, and software that enabled them to hook into each other's hard drives. Members could then swap files without the direct involvement of Napster.

Napster was thus able to give its members access to massive amounts of music without having to store a single note itself. It's clear that most of the recordings were being distributed in violation of copyright laws. If Napster had been storing pirated music on its site, it would have been shut down in days. The reason it lasted so long was that it could quite credibly argue that it was an innocent intermediary. If users happened to be trading pirated music it was no more Napster's fault than it's the fault of the postal service if people mail home-taped cassettes to one another.

Napster hadn't just found a way of dodging the copyright lawyers, it had solved a problem plaguing many large networks, especially the Internet. The client-server models they are built on are hierarchies, and like all hierarchies they're great as long as you are near the top. But most small-time users are near the bottom, shackled to an Internet service provider and its rules.

Napster's Achilles' heel was that it retained a trace of the client-server model. Because members were dependent on Napster for software and indexes, record companies had a target to go after. And go after it they did. In December 1999, EMI, BMG, Sony, Warner, Universal and the Recording Industry Association of America sued Napster for copyright infringement. Although the suit is not yet settled, Napster suffered a terminal blow last month when a US court of appeal ordered it to stop enabling

the exchange of copyrighted material. Napster has effectively thrown in the towel and is now trying to find a way of charging for its services so it can pay royalties.



But there is a P2P network that looks capable of evading the lawyers. Called Freenet, it's a radical system created from the ground up to be anonymous and censorship[注 1]-proof.

Freenet uses the Internet as a backbone to send and receive information, and identifies each computer by its IP address. But it covers its tracks whenever information is transferred.

Hooking your computer up to Freenet, first you download the software from the Web. Then you contact other Freenet computers, whereupon your computer becomes a Freenet "node". Freenet is made up of thousands of these nodes, and each one can make files available. When you "insert" a file—say an MP3—into Freenet it is encrypted and then copied to several other nodes. Each node knows which documents it holds and also has information about documents stored on a few other nodes. Neighbouring nodes communicate routinely, updating one another on additions to the network. But no single node knows about more than a fraction of the entire network.

How do you get information out of a system like this? As Clarke[注 2] explains it, the strategy is similar to the way people navigated before maps. Starting out, a group of travellers might have known only to go north. But the closer they got to their goal, the more detailed was the information they got from people they asked, until finally they found someone able to tell them that yes, the minstrel they were looking for lived right around the corner, second hovel on the right.

Before you start a Freenet search, you must know the title of the document you're looking for. Each document also has a numeric key that is cryptographically linked to the title, and it's this you're actually looking for during a Freenet search. Let's say you know the key is 123—though of course real keys will be a lot more complex than that. Each node, including yours, knows what documents

it holds, and also has a list of documents held by a few other nodes. Your computer will look to see if it has document 123. If not, it will look up to see if it knows a node that has document 123. If it doesn't, it contacts the node with the document that comes closest—maybe document 135. That node might not know where 123 is either, but it knows which node has document 119, so it sends the request there. The idea is that with each request you get closer to the document you really want. When the document is found, it's returned along the request chain (see Diagram). As the document is returned, each node along the chain makes a copy of it and stores it.

One consequence of this is that the more requests come in for a piece of information, the more copies there will be on the network, and the easier it will be to find. It also means there's no way of telling where the document originally came from. All you know is that you asked a neighbouring node for it, and it fetched the document from somewhere. Conversely, if you receive a request for a file, you have no idea who made it.

The result is a censorship-proof network. If the powers that be request a file from a node they'll get a copy. If they seize that node they'll definitely find a copy. But it would be impossible for them to prove that the file was there before they requested it, so the exercise amounts to entrapment, Clarke says. And because documents are stored in encrypted form, the node's owners can argue truthfully that they had no idea any particular document is held there. What's more, as the act of requesting a document generates new copies, censorship is self-defeating.

Not everyone accepts that Freenet is as censorship-proof as Clarke thinks. Creighton reckons he can bring it down by getting the IP addresses of individual nodes, sending letters to ISPs, and taking some users to court, just as he wants to do with Gnutella.

But if Clarke turns out to be correct, Freenet will usher in a different world. No one will be able to stop you downloading free music files from the Internet. You'll be able to criticise the rich and powerful without fear of being silenced or punished. And you'll be able to read whichever spy memoir your government is trying to suppress at the moment.

By the same token, you'll be powerless to stop people from plagiarising your copyrighted work or telling lies about you. Napster set out to give us free music, but it seems to have put us on the road to absolute freedom of speech. If so, the real challenge hasn't even begun.

(*New Scientist* vol 169 issue 2281 - 10 March 2001, page 32-36 より一部修正の上引用)

(注 1) censorship: 検閲 (注 2) Clarke: Freenet 作者の名

問 1　下線部　の理由を簡単に述べよ．

問 2　下線部　を日本語訳せよ．

問 3　下線部　が示す図表の内容を，本文に即して説明せよ．

問 4　下線部　に”The result is a censorship-proof network.” とあるように，ここに提案されているシステムはデータの検閲やデータの出所の特定が困難であると主張されている．その理由について本文に即して説明せよ．

問 5　この記事の内容を英文で要約せよ（100 words 程度）

問 6　Napster, Freenet などの P2P ファイル交換サービスは，原著論文などの個人の創作物・著作物の扱いについて影響力をもつと考えられている．このようなサービスの存在のもとで，個人の学術論文の価値を守り，かつ広く利用してもらうための方法について自由に論ぜよ．かならずしも記事の立場に立たなくても良い．

問題は，このページで終りである．

解 答 冊 子

小 論 文

氏 名		受験番号	

博士 (前期) 小論文 解答用紙 (1)

科 目 名
小 論 文
問 題 番 号
I
点

博士 (前期)
小論文 (1)

問 1

問 2

(枠内に解答を書くこと)

氏 名		受験番号	

博士 (前期) 小論文 解答用紙 (2)

科 目 名
小 論 文
問 題 番 号
I
点

博士 (前期)
小論文 (2)

問 3

問 4

(枠内に解答を書くこと)

氏 名		受験番号	

博士 (前期) 小論文 解答用紙 (3)

科 目 名
小 論 文
問 題 番 号
I
点

博士 (前期)
小論文 (3)

問 5

問 6

(枠内に解答を書くこと)

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