The TEK System: Browsing the Web in Low-Connectivity Communities

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http://cag.lcs.mit.edu/tek
Web Browsing: Current Method

user

GOOGLE
Web Browsing: Current Method

1. Connect to ISP
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2. Send query to search engine, wait for reply
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3. Read through results
Web Browsing: Current Method

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5. If results good, click on site, wait for reply
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7. If site down or not useful, look for other sites
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What are the barriers to access?

1. High telephone fees
2. High ISP fees
3. Low-Bandwidth
4. Low-Connectivity
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\{ Should minimize \textit{time online} \}
\{ Should minimize \textit{data transfer} \}
Web Browsing: Current Method

What are the barriers to access?

1. High telephone fees
2. High ISP fees
3. Low-Bandwidth
4. Low-Connectivity

\[
\begin{align*}
\text{user} & \rightarrow \text{ISP} \rightarrow \text{GOOGLE} \\
& \quad \rightarrow \text{SITE #1} \\
& \quad \rightarrow \text{SITE #2}
\end{align*}
\]

\begin{align*}
\text{Should minimize} & \quad \text{time online} \\
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\[\text{Current method is inappropriate!}\]
Web Browsing: TEK Approach

Solution has two components:
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2. Transfer all data through email, not http
   - Connect only to send/receive email, not to browse web
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TEK: “Time Equals Knowledge”
Outline

• Protocol Details
• Rationale
• Server Details
• Current Status / Demo
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Protocol Details

User → ISP → TEK SERVER → GOOGLE → SITE #1, SITE #2
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0. Install TEK proxy server on user machine
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1. Users start web browser and login to TEK proxy
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5. Server performs search, filters results and replies
6. Administrator finds results in email and opens them
7. Users can view results on future logins
Protocol Details

Additional features

1. Accumulates digital reference library on client
2. Reliable email-based communication protocol
Outline

- Protocol Details
- Rationale
- Server Details
- Current Status / Demo
Rationale I: Decreased Cost

• Email accounts cheaper than web access
• Phone lines are cheaper, clearer, and more stable during off-peak hours
• Connection time is shorter
  – User reads pages offline, not while connected
  – Content is direct from ISP, not a distant server
  – Results are more compact due to TEK Server
• Local web cache can prevent some searches
Rationale II: Improved Reliability

- Email reduces dependence on network
- Never need continuous path from client to server
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Rationale III: Improved Convenience

• **Sending email at night:**
  - Frees telephone for other daytime uses
  - Avoids daytime traffic in connecting to ISP

• **Offline viewing of results is quick and reliable**
  - More people can use computer during daytime

• **More relevant results thanks to TEK server**
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Server Details

• Extensive server-side processing
  – Optimized for bandwidth, not speed
  – Gathers pages from other search engines
  – Filtering
    • Removes duplicate or similar pages
    • Looks for paragraph text, not just links
    • Dither or remove images
  – Compresses the result set

• Keeps track of each user
  – Avoids sending a page twice to a given machine
  – Enables more intelligent page ranking
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Status

• Fully-functional prototype of TEK system
  – Implemented in Java
• Looking for users by summer 2002
• Future Work
  – More intelligent query-builder on client
  – Consider multi-language interfaces
• Demo