Analysis of Cache Effectiveness

<table>
<thead>
<tr>
<th>Analysis name</th>
<th>Documents not cached</th>
<th>Description of set of documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hit Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR(ALL)</td>
<td>BT(ALL)</td>
<td>None</td>
</tr>
<tr>
<td>HR(-RFC)</td>
<td>BT(-RFC)</td>
<td>Non-cacheable</td>
</tr>
<tr>
<td>HR(-ACTUAL)</td>
<td>BT(-ACTUAL)</td>
<td>Actual misses</td>
</tr>
</tbody>
</table>

The curves HR(ALL) and BT(ALL) show the maximum potential hit ratio and bytes saved, respectively, based on only the URLs of requests in the proxy trace.

For the Prodigy traces, where the HTTP headers were not available, the cache status trace field [NETS97] were used to determine cacheability.

For UBS, the HTTP/1.1 Specification was used to determine cacheability. See the implementation at [PEVZ98].

The curves HR(-ACTUAL) and BT(-ACTUAL) show the actual hit ratio and bytes saved as indicated by the cache status 'hit' in the trace. Actual misses reflect the finite cache size.

Table 1

The large gap between HR(-RFC) and HR(-ACTUAL) partly occurs because Squid 1.21 never caches documents with cookies although the HTTP/1.1 specification ([FIEL97], Section 13) lets the origin server to specify whether such documents are cacheable. Our analysis program [PEVZ98] follows RFC 2068. According to [CACE98], the analysis of an ISP trace showed that over 30% of all responses contained cookies.
Figure 1 - Prodigy Trace

Hit Ratios

Hit ratio

HR(ALL) - Hit Ratio
HR(-RFC) - Hit Ratio (non-cacheable documents not counted)
HR(-ACTUAL) - Hit Ratio (actual misses not counted)

Trace length

Fractions of Bytes Transferred saved by caching

Fraction

BT(ALL) - fraction of bytes saved by caching
BT(-RFC) - fraction of bytes saved by caching (non-cacheable documents not counted)
BT(-ACTUAL) - fraction of bytes saved by caching (actual misses not counted)

Trace length

Refresh ratio

Refresh ratio

Trace length
Figure 2 - UBS Trace

Hit Ratios

Fraction

Fractions of Bytes Transferred saved by caching

Refresh ratio

Figure 2 - UBS Trace