A Comparison of HTTP and HTTPS Performance

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Outline

• Review of secure Web communications
• Experimental design
• HTTP and HTTPS performance
• Conclusions
HTTP Transaction

Client Browser  Web Server

TCP Connect

HTTP GET transaction
Measured Calls

Socket = TCP-connect( URL );

start-timer;
TCP-write( HTTP-Request );
while ( data-available ) {
    TCP-read( HTTP-Response );
}
end-timer;
HTTPS

HTTPS

SSL

TCP
HTTPS Transaction

Client Browser  Web Server

TCP Connect

SSL Connect

HTTPS GET transaction
Measured Calls

Socket = TCP-connect( URL );
SSL-connect( Socket );

start-timer;
SSL-write( HTTP-Request );
while ( data-available ) {
    SSL-read( HTTP-Response );
}
end-timer;
Secure Performance Issues

• Comparison of HTTP and HTTPS GETs
• SSL connect delay
WebPerf System

• Robot browser
  – HTTP 1.0
  – Proxies
  – SSL

• Oracle 7.3 SQL 92 Database
  – Experiments
  – Results
Robot Browser Implementation

- Visual C++ 5.0, optimized
- Single-threaded
- Winsock 1.1
- SSLeay 0.8.1 (by Eric A. Young)
- RogueWave and Oracle OCI
Experimental Setup

• Intranet: Robot PC and Server PC
• Measured downloads in
  – HTTP
  – HTTPS export grade encryption (40 bit keys)
  – HTTPS domestic grade encryption (128 bit keys)
Robot PC

- Windows NT Workstation 4.0
- 100 MHz Pentium, 32 MB, NE 2000 NIC
- 10 Mbps Ethernet
- Connected to server via unswitched hub
Server PC

- Netscape Enterprise Server 3.5.1
- Microsoft Internet Information Server (IIS) 4.0
- Windows NT Server 4.0
- 200 MHz Pentium, 256 MB, 100baseT Ethernet NIC
Downloaded documents

• Prefix of HTTP Specification in HTML

• Sizes in KB:
  1, 2, 3, ..., 18, 19, 20
  40, 60, 80, 100
Duration (100K)

Non-secure  Secure (40)  Secure (128)

Netscape

Microsoft

95%  75%
Duration (20K)

Non-secure  Secure (40)  Secure (128)

Netscape

Microsoft

95% 75%
Conclusion

• HTTPS only slightly slower than HTTP