A Study of End-to-End Web Access Failures

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What is this paper about?

➢ Utilizing the client vantage point to study failures and the reasons for those failures.

1) Identifying correlations in the failure patterns to determine likely cause of failure
2) Investigating relationship between network routing problems and end-to-end failures through correlation of client/server side failures and routing instability
Why do we care?

➢ End host vantage point complements previous work on individual components (BGP, DNS, TCP)

➢ Significant instance of DNS and TCP failures underscore need for client vantage point

➢ Overall failure rate of web accesses is LOW but not NEGLIGIBLE
MAJOR FINDINGS

➢ 34-42% of failures due to DNS problems, 74-83% of which are caused by client’s inability to connect

➢ 57-64% of failures due to TCP connection failures

➢ Server-side problems are the dominant cause of TCP failures

➢ 70% of websites had a ≥5% failure rate over an hour period

➢ Severe BGP instability is rare, but causes significant failures
Analysis Framework
➢ Access fails when one of the following events happens
  DNS - LDNS timeout, Non-DNS timeout, Error Response
  TCP - no connection, no response, partial response
  HTTP error (eg 404)
Correlating failures with a source

➢ Server-side
➢ Client-side
➢ Client-server-specific
➢ Proxy-related
Clients
➢ PlanetLab (PL)
➢ Dialup (DU)
➢ CorpNet (CN)
➢ Broadband (BB)

Websites
➢ Varying geographic location and popularity (eg amazon.com, latimes.com, luftansa.com)

Assign failure to client-side, server side etc using BGP, traceroute data
Experimental Results

TCP

Table 4: Breakdown of DNS failures
Correlation Analysis

➢ Used to determine root cause of failure episode
➢ Blame attribution procedure to classify failures per episode
➢ Failure episodes: 1 hour
➢ Validate indirectly via spread of server side failures, correlation between co-located clients
Important Findings

➢ Significant fraction of failures due to inability of client to access local DNS server
➢ Severe BGP instability coincides with increased failure rate
➢ Majority of connection failures are due to failure in establishing connection
YEAH, IF YOU COULD GIVE ME YOUR THOUGHTS ON THE PAPER

THAT WOULD BE GREAT