The Mystery Machine : End-to-end performance analysis of large-scale Internet services

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The paper presents an end-to-end performance analysis of the large-scale Internet services (Facebook). They also validated the their methodology by analyzing performance traces of over 1.3 million requests to Facebook servers. The Mystery Machine relies on the law of large numbers to automatically build causal relationships between the components (segments) of a request. The paper provides an introduction of large-scale Internet services and discusses the end-to-end request tracing. It further describes the relationship model of The Mystery Machine along with the algorithm and analysis.

The paper presents a detailed study of the factors that affect the end-to-end latency of requests to Facebook servers. The performance properties analyzed by the authors are high-level. One key strength of this paper is that it discovers and updates dependencies in a request automatically. This is a key feature because the underlying logging infrastructure is constantly evolving. Use of `UberTrace` is another merits as UberTrace uses sampling to reduce overhead. The shortcomings of this paper is that The Mystery Machine makes the assumption that the segments in a call graph are acyclic. It is unclear how the system design would need to be changed in the presence of cycles (e.g., what happens when the same pair appear more than once in a request trace).

One interesting direction would be to extend this work to gather more information in a targeted way to do more low-level performance debugging (e.g., what code is responsible for the slow down?). The paper presents the end-to-end performance analysis of desktop scenario. It can be further extended to look into the end-to-end performance analysis of the mobile platforms.