The Tangled Web We Weave: Analyzing the Web's Dependency Graph

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ABSTRACT

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1. INTRODUCTION

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2. RELATED WORK

Over the years, we have seen an increase in potential attack vectors for malicious parties. One such attack vector is side channel attacks — utlizing leaked information to undermine the security of applications and systems. Our related work is split into two main areas: a discussion on side channel attakcs and mitigations as well as a discussion on constant time implementations.

There has been a plethora of work done on the prevalence of side channel attacks.

Moverover, there has been plenty of work completed on avoiding these side-channel attacks, mainly through variosu constant time implementations.

The importance of the world web in our daily lives is a well worn justification for its study. Of particular importance to this work is the comprehensively studied area of web caching in which researchers observe that popular websites exist and that storing local copies of these sites can provide performance gains and bandwidth reductions [3]. There are a myriad of techniques for performing caching that rely on locality of reference for pages and objects [16]. While exploring the long history of web caching is beyond the scope of the paper, we note several pieces of work that tease out specific properties of web pages. For example, researchers have noted that caching can be performed at finer-grained levels than pervious discussed [20] and others have pointed out that pages consist of extraneous content that might be suitable for filtering [8]. Further, recent studies in this area explore interesting properties of web pages and objects for use in specific areas such as the broadband domain [18] as well as for use by mobile devices [15].

Several measurement papers have explored the recent trends in page-level characteristics as well as in redundancy and caching [7]. A striking finding that shares motivation with this work is the increased complexity of web pages. Ihm et al. [4, 7], for example, explore metrics for measuring website complexity and characterize object types as well as their locations, servers, origins. Much of this complexity and third-party content has been attributed to online advertising. Several papers explore this space, but most notably Barford et al. [1] and Guha et al. [6].

One implication of this complexity is an increase in the opaque nature of the interactions on the web. Several pieces of work shine light on this problem at a coarse-grained level, for example, by using DNS to understand transactions [2] or by examining interactions and dependancies between websites [14]. An additional consequence of complexity is performance. A new body of work explores how to understand and improve web page load performance [19]. A particularly relevant piece of work in this domain is [11], which creates fine-grained dependency graphs in order to help prioritize object loads.

The potential security and privacy consequences of third-party content are well explored. Initial work in the drive by download arena [5, 12, 13] note that in addtion to webpage compromise, inclusion of object from other domains create risk. Malicious advertising, as a particular form of third party content on a website, has received considerable attention [9, 21]. Another form of third-party content that has been an active area of measurement is exploring the privacy implications of online tracking [10, 17].

3. FORMALIZATION

4. IMPLEMENTATION

5. EVALUATION

6. FUTURE WORK

7. CONCLUSION

Conclusion

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