Privacy preseving sequential padding in web-based applications

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Abstract— These Encrypted traffic of many popular Web applications may actually contain disclose highly sensitive data, and lead to serious breaches of user privacy. Specifically, when searching for unique patterns exhibited in packets' sizes and/or timing, a hacker can potentially find an application's internal state transitions and the users' inputs. A solution for preventing this type of side channel attack is padding packets such that each packet size will no longer map to the unique input. One extreme cases to pad all packets to the identical size, namely, maximizing. We design many heuristic algorithms for solving these PPTP problems in polynomial time with acceptable overhead.

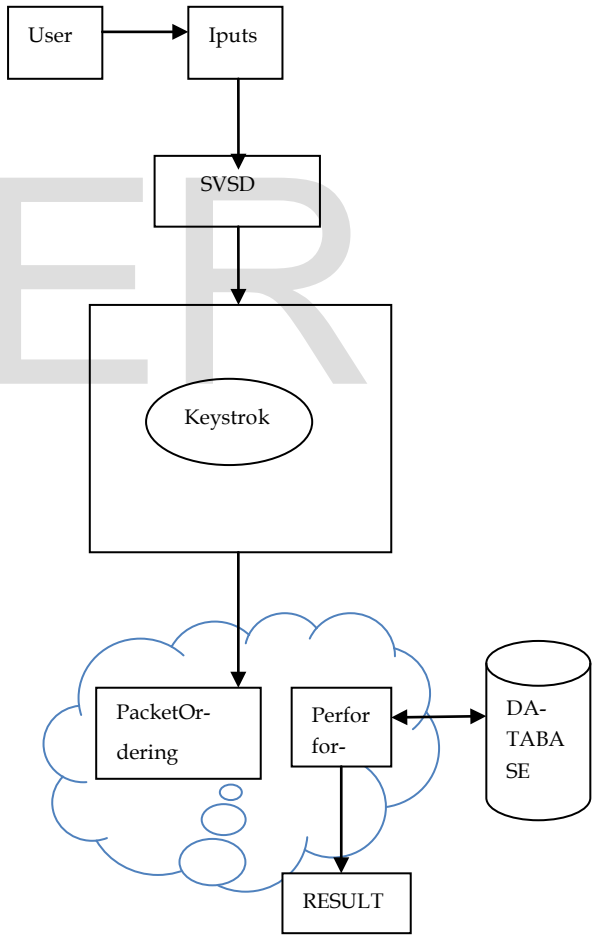
Index Terms— I-Diversity, k-In distinguishability, PPTP, PPDP, Side-Channel Leak, Traffic Padding, Web Application.

1 INTRODUCTION

Network security consists of the provisions, policies adopted by a network administrator for preventing and monitoring illegal access, misuse, modification, or denial of computer network and network accessible resources. Network security involves in authorization of accessing the data in a network, which is controlled by network administrator. And it covers a variety of computer networks, such as public and private, which are used in everyday job conducting transactions and communications in between businesses, government agencies and individuals. These networks can be private, such as within a single company, and others might be open to public accesses. Network security is involved in enterprises, organizations, and other type of institutions. Web-based applications are gaining popularity and they require less client-side resources, they are easier to deliver and maintain. Other hand, Web applications may also present new security and privacy challenges, because the un-trusted Internet has an integral component of such applications for carrying the continuous interaction between users and servers. Many high profile Web applications might have sensitive user inputs, they may leaking the input from encrypted traffic due to side-channel attacks.

In our proposed system, we first present a model of the PPTP issue based on the mapping to PPDP, which formally characterizes the interaction between users and Web applications,the observation made by eavesdroppers, the privacy requirement ,and the overhead of padding we present a formal PPTP model encompassing the privacy requirements, padding costs, and padding methods. And then formulate PPTP problems under different scenarios, analyze their complexity, and design efficient heuristic algorithms. Next, we design several heuristic algorithms for solving the PPTP problems in polynomial time with acceptable overhead. Finally, we demonstrate the effectiveness and efficiency of our algorithms by both analytical and experimental evaluation. The remainder of the paper is prepared as follows. In Section II, the related work which is surveyed. In Section III, solution methodologies will be described. In Section IV, performance analysis and finally, we conclude the paper in Section V.

1.1 System architecture



2 RELATED WORK

Kehuan Zhang proposed a suite of new techniques for automatic detection, quantification of side-channel leaks in web applications. This approach, called Side buster, it automatically analyses the application's source code to detect its side channels then performs a rerun test to assess the amount of

information disclosed through channels. Side buster had been designed to work on event-driven applications and can effectively handle the AJAX GUI widgets which we are using in most web applications.[1] Michael Backes developed a framework for derivation of formal guarantees which is against to the traffic side-channels. And he presented a model which captures important characteristics of web traffic, defined measures of security, and also provided an assembly kit for countermeasures and their security guarantees, and showed that security guarantees are preserved on lower levels of the protocol stack.[2] George Dean Bissias at el proposed a straight forward traffic analysis attack against encrypted HTTP streams that is surprisingly effective in identifying the source of the traffic. An attacker twitches by creating a profile of the statistical characteristics of web request including distributions of packet sizes and inter-arrival time then candidate encrypted streams is compared with these profiles. He used real traffic, and found that many web sites were subject to these attacks. He also proposed some counter measures and improvements to the current method. Previous work analyses SSL traffic to a proxy, and taking advantage of a known flaw in SSL. It revealed the length of each web object. In contrast, he exploited the statistical characteristics of web streams that were encrypted as a single flow [3].Janak J. Parekh at el addressed a new approach to enable the sharing of suspicious payloads through privacy-preserving technologies. He detailed the work which had done with two examples payload anomaly detectors, PAYL and Anagram. It supports generalized payload correlation and signature generation without releasing identifiable payload data and without relying on single-site signature generation. And he presented preliminary results of our approaches and suggested how such deployments may practically be used for cross-domain alert sharing and its implications for profiling threats [4] Charles V at el proposed a novel method for finding statistical traffic analysis algorithms by morphing one class of traffic to look like other class. By using convex optimization techniques, he showed how to optimally modify packets in real-time and reduced the accuracy of a variety of traffic classifiers while incurring less overhead than padding [5] Wen Ming Liu addressed a novel random ceiling padding approach which gives resistant re

sults to adversarial knowledge. This approach injects randomness into the process of forming padding groups, then that adversary would still face sufficient uncertainty in estimating user inputs. He formally presented a generic scheme and discussed two concrete instantiations then confirmed the correctness and performance of this approach via theoretic analysis and experiments with real world applications [6]. David M. Nicol at el used simulation and analytic models to find the impact on user experience of a scheme. It masked the behavior of real traffic by embedding these models in synthetic and encrypted traffic. Through these models he investigated the effects on the user experience. This point provided a novel context where he observed the synergy of simulation and analytic modeling and showed that a detailed simulation model of network traffic characteristics can be used to estimate the parameters of an analytic model of tunneling [7]. Zhiguo Wan proposed an unobservable secure routing scheme USOR scheme and offered complete unlink ability, content unobservant ability for all types of packets. USOR scheme is efficient and it uses a novel combination of group signature and ID-based encryption for route discovery. He implemented USOR on ns2, and evaluated its performance by comparing with AODV and MASK. The simulation results showed that USOR has satisfactory performance compared to AODV, and also this scheme achieves stronger privacy protection [8].

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3 METHODOLOGIES

3.1 USER INTERFACE DESIGN

To connect with server user should give their username and password then, they can able to connect to the server. If in the case user already exits directly they can login into the server or else user must register their details such as username, and Email id, password, into the server. Then server will create the account for users to send files over internet with more security.

3.2 KEY STROKE

In this module, the data is given by customer requests goes to server, Keystroke logging, often referred to as key logging or keyboard capturing, is the action of recording (or logging) the keys struck on a keyboard, characteristically in a covert manner so that the person using the keyboard is unaware that their actions are being monitored. Each and every packet exhibit same size and different type of patterns

3.3 MAPPING PPTP TO PPDP

In this model alone may lead to excessive data distortion or insufficient protection Privacy-preserving data publishing (PPDP) provides methods and tools for publishing useful information while preserving data privacy. The k-anonymity model divides the table into anonym-zed groups and then generalizes the quasi-identifier such that at least k individuals in the table will share the same generalized, and hence a linking attack using this quasi-identifier will fail.

3.4 PACKET ORDERING

In this model received packets are going to sort using

SVSD diversity algorithm. It first sorts the actions in non-increasing order of their weight values, then among the actions with same weight, and sorts them in a predefined order based on their flow-vectors.

4 TECHNIQUE USED

In this proposed system we are mainly using SVSD Simple Algorithm. The main intention of presenting the SVSD Simple algorithm is to show that, when applying k-in distinguishability to PPTP problems, an algorithm may sometimes be devised in a very forthright way, and yet attain a dramatic reduction in costs when compared to existing approaches. Basically, the SVSD Simple algorithm attempts to minimize the cardinality of padding groups in the SVSD case.

SVSD Algorithm:

Input: a vector-action-weight set VAW, the privacy property l;
Output: the partition PVAW of VAW;
Method:
1. Let PVAW = ;;
2. Let S be the sequence of VAW in a non-increasing order of its W;
3. If(pr(S[1]; S) > 1
l)
4. Return;
5. Sort elements in S with same weight value
in non-increasing order of its V ;
6. While (S 6= ;)
7. Let P_□ = fS[i] : i 2 [1; _]g, P_+ = fS[i] : i 2 [_ + 1; jSj]g;
8. Let _ 2 [l; jSj] be the smallest value such that:
pr(S[1]; P_□) _ 1
l and
(pr(S[_ + 1]; P_+) _ 1
l or P_+ _ ;)
9. Create partition P_□ on PVAW;
10. S = P_+;
11. Return PVAW;

5 PERFORMANCE EVALUATION

In this section sorted packets are received by server. Here we have presented algorithms to determine the amount of padding for each and every flow given in the vector action set. First, gather information about possible action-sequences and corresponding vector-sequences in the application. Second, feed the vector action sets into our algorithms to calculate the desired amount of padding. Third, implement the padding according to the calculated sizes.

6 CONCLUSION

We have proposed a formal model for quantifying the amount of privacy protection provided by traffic padding solutions. Our algorithms have confirmed the performance of our solutions to be superior to existing ones in terms of communication and computation overhead.

FUTURE ENHANCEMENT

Traffic morphing is proposed to alleviate the threats by traffic examining on packet sizes and sequences over network. Although proposed system morphs classes of traffic to be indistinguishable, traffic morphing pads or splits packets on the fly which may degrade application's performance. Quasi-identifiers are pieces of data that are not of themselves matchless identifiers, but they are sufficiently well correlated with an entity that they could be combined with other quasi-identifiers to create a unique identifier. In proposed warn about potential privacy breaches being enabled by publication of large volumes of government and business data containing quasi-identifiers. As an example, neither gender nor postal codes uniquely identify an individual, but the combination of all is sufficient to identify 87% of individuals a country. A search engine will no longer provide auto-suggestion feature once the query string beats a certain length.

AKNOELEDGEMENT

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REFERENCES

1.TITLE:Sidebuster: Automated Detection and Quantification ofSide-Channel Leaks in Web Application Development.

AUTHOR: Kehuan Zhang, Zhou Li, RuiWang,XiaoFeng Wang

YEAR: Feb. 2011.

2.TITLE:Preventing Side-Channel Leaks inWebTra_c: A Formal Approach

AUTHOR: Michael Backes

YEAR: NOVEMBER 2 2007.

3.TITLE: Privacy Vulnerabilities in Encrypted HTTPStreams

AUTHOR:George Dean Bissias, Marc Liberatore, David Jensen

YEAR:2005

4.TITLE:PrivacyPreservingPayloadBasedCorrelation forAccurate Malicious Traffic Detection

AUTHOR:Janak J. Parekh, Salvatore J. Stolfo, Ke Wang

YEAR:2007

5. TITLE:Traffic Morphing: An Efficient DefenseAgainst Statistical Traffic Analysis

AUTHOR:Charles V. Wright1FabianMonrose

6. TITLE:Background Knowledge-Resistant Traffic Padding forPreserving User Privacy in Web-Based Applications

Wen Ming Liu_, Lingyu Wang_, KuiReny, MouradDebbabi_

7.TITLE: Models of Privacy Preserving Traffic Tunneling

AUTHOR:David M. Nicol

Nabil Schear

8.TITLE:KIPDA: k-Indistinguishable Privacy-preserving Data Aggregation in Wireless Sensor Networks

AUTHOR: Michael M. GroartWenbo He, Stephanie Forrest

YEAR:2011

9.TITLE:USOR: An Unobservable Secure On-Demand Routing Protocol for Mobile Ad Hoc Networks

AUTHOR:Zhiguo Wan, KuiRen, and Ming Gu

10.TITLE::Anomalous Payload-based Worm Detection and Signature Generation