

Computational Model for Capturing the Interdependencies on Information Processes.

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ABSTRACT

We propose a cognitive architecture and a computational model that allow representing an information process with a variable property, opening up opportunities for studying the forms of its behavior. Entangled processes are considered to occur simultaneously, as coexisting processes that have a common source of origin, and the state of their system is represented by a superposition of components. As it turns out, the integrity of resources is violated when the conditions for the emergence of architecture with a variable property arise in a tangle of process dependencies. This creates entangled information processes. This occurs in the emergence of vulnerabilities in the Web environment such as cross-site scripting XSS. The models and mechanisms of complex interdependencies on the Internet still remain poorly understood.

INTRODUCTION

The increase in the number of external downloads and their distribution creates an attractive attack vector for compromising large numbers of clients through common dependencies and platforms used on popular sites. Approximately 33% of a million sites download unknown content indirectly through at least one third-party organization, exposing users to resources that the site operators have no relationship with. Combined with the observation that 87% of sites are executing active content (such as JavaScript) from an external domain, a confusing picture of attacks emerges. Scripting vulnerabilities are notable, and are destructive to web application development: deceptively simple to reason and fix, yet surprisingly difficult to prevent in large-scale web development. This is a well-known deliberate entanglement effect known as XSS (Cross Site Scripting), which occurs when insufficient validation, sanitization, or escaping of data in a web application allows an attacker to cause malicious JavaScript to execute on the browser side in the application context. This injected code can then do whatever the attacker wants by using the victim's [7] privileges, [8]. Exploiting XSS errors results in a complete (though not necessarily permanent) compromise of the victim's session with the vulnerable application. Current resource integrity techniques such as Sub-Resource Integrity (SRI) are not applicable to unknown content, and mitigation of such attacks remains open [11]. Complex Internet interdependencies have implications that go beyond vulnerabilities [13].

METHODS

In this work, the method of indexed expressions [10] is used, which allows the semantic model to take into account the stages of knowledge and their development. The resulting information graphs [6], by analogy with [19], can be interpreted as a data flow propagation environment, which in this sense can control their interference. On their basis, a toolkit for the management of cognitive information [2] can be developed. In addition, in this work, the ideas of modeling information processes by variable domains [17] are largely inherited. The features of process inheritance proposed in [3] have been taken into account. The model solutions used are also based on the idea of channelized propagation of [5] processes. Finally, the possibilities of jump transitions of processes [4], as well as the effects of entanglement of information processes [18], potentially causing cognitive interference and its propagation along the network channels, are taken into account.

ENTER FINDING #2

Today, there is still no common understanding of the mechanism of entanglement of information processes. In this paper, we propose a cognitive architecture and a computational model that allows to support an information process with a variable property. Entangled processes are considered to be occurring simultaneously, coexisting processes that have a common source of occurrence, but, possibly, different properties. As it turns out, the integrity of resources is violated when the conditions for the emergence of an architecture with a variable property arise in a tangle of process dependencies. This creates tangled information processes. This occurs in the arising of vulnerabilities in the Web environment, similar to XSS cross-site scripting. The complex interdependencies on the Internet have implications that go beyond security that remain poorly understood. I

DISCUSSION

As the analysis of [12] shows, [1], popular sites download an average of 73 resources, 23 of which are downloaded from external domains – each double the corresponding figure five years earlier. However, a small number of third parties serve resources for a significant portion of the sites that provide these remote resources. Shared platforms deliver content to many sites – Content Distribution Networks (CDNs) serve 60% of the Top Million, and Cloud Service Providers serve 37% of the Top Million. The increase in the number of external downloads and their distribution creates an attractive attack vector for compromising large numbers of clients through common dependencies and platforms used on popular sites. Approximately 33% of a million sites download unknown content indirectly through at least one third-party organization, exposing users to resources that the site operators have no relationship with. Combined with the observation that 87% of sites are executing active content (such as JavaScript) from an external domain, a confusing picture of attacks emerges.

In Section 2 we construe a generalized example of a process dependency architecture where an information process exhibits a variable property. As shown, the emerging presentation complexities are fundamental.

ENTER FINDING #1

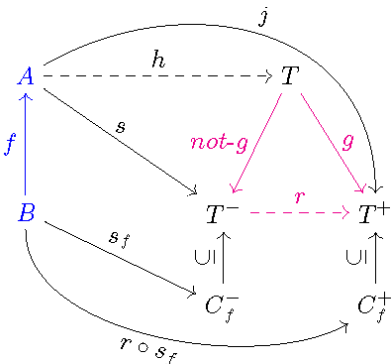


Fig. 1. Entanglement of processes

ENTER FINDING #3

We give a generalized example of conditions when an information process with a variable property arises. A similar example was discussed earlier in structures like the semantic net. The construction of a mathematical model is known as the "Problem of quick (agile) Smith" [16] and illustrated by the situation of the marriage g of Smith s , changing his name r to Jones j , and it is known that A already had Jones j , who was already married g . It turns out that the model presented below also characterizes the type of quasi-entanglement, similar to the known Schrödinger's cat model.

CONCLUSIONS

1. The observed increase in the amount of information on the Web gives rise to multiple dependencies of information processes, which gives rise to a tangle of dependencies.
2. As it turns out, the integrity of resources is violated when in a ball process dependencies, conditions are created for the occurrence of variable property architectures. This generates entangled information processes and architecture of the Schrödinger's cat model.
3. In practice, in particular, in the Web environment, vulnerabilities such as XSS cross-site scripting are generated.
4. Models and mechanisms of complex interdependencies of information processes on the Internet remain insufficiently studied, and the complexities of their representation are not only mathematically complex, but also have fundamental significance.

ACKNOWLEDGMENTS & REFERENCES

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