

Applying dynamic taint propagation in order to enforce domain driven security

Specification and Time Schedule

FREDRIK ADOLFSSON

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Supervisor: Musard Balliu

Examiner: Mads Dam

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School of Computer Science and Communication

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Chapter 1

Background

Domain Driven Security (DDS) is a methodology that can be seen as an extension to Domain Driven Design (DDD). The core concept, in simplified form, is about focusing on the development of the core domain models. By making sure that they are correctly modeled and implemented can we as well make sure that validation before propagation can be correctly executed. [1, 2, 5, 3]

The thesis is of importance in the security field where every step towards more secure applications is something good. However, the work will gain those who practice the methodology of DDD/DDS the most. But by making progress in the DDD/DDS field might lead to more people following the practice and therefore lead to better applications for them as well.

1.1 Objective

The concept of DDS have been born and is in "development" from consultants at Omegapoint. This means that everything that might validate, invalidate or evolve the mythology in any way is of interest for them. The topic for this thesis was born and discussed at Omegapoint's latest tech talk, OP Tech Talks [4]. Since Omegapoint regularly offers master thesis positions was this an excellent topic to offer.

Omegapoint would like to see, except for a thesis that is of KTH's expected standard, a prototype of a possible implementation of a dynamic taint propagation tool which can support the claims in my thesis.

Chapter 2

Research Question & Method

How can dynamic taint propagation help a practitioner of Domain Driven Security.

2.1 Problem Definition

The first challenge is to implement the dynamic taint propagation tool. It should be sufficient for it to be a prototype and not a tool that is ready for deployment. The second challenge will be to evaluation how well the tool might help a DDS practitioner. It might be possible that it is not worth using at all because of possible overhead it might entail. Questions such as accuracy, false positive, added time complexity could/should be answered.

2.2 Examination Method

A dynamic taint propagation tool will be implemented. This tool will then be used to evaluate different implementations of application, both with and without the methodology of DDD/DDS. The applications could be self written but it would also be interesting to validate, if possible, existing applications.

2.3 Expected Scientific Results

The relevance in the report lies in the hypothesis that Domain Driven Design can be used to develop complex and secure software. Which

is currently discussed and "developed" by consultants at Omegapoint. The hypothesis is that we can help in the process but the question is with how much and if there are negative side effects.

Chapter 3

Evaluation & News Value

3.1 Evaluation

The value of the the implemented tool should be discussed and possible compared with similar tools. The research questions should as well have been answered and discussed in relation to the results.

3.2 Work's Innovation/News Value

The work will be of interest for practitioners of Domain Driven Design. Where they might be interested to use the tool to secure that the development of their applications is done correctly. It might also be of value to individuals who want to enhance the security of their application but not certain how. The tool will hopefully bring them over to develop software with Domain Driven Design methodology in mind.

Chapter 4

Pre-study

The literature study will focus on taint propagation, DDD/DDS and what they are all about. Research into JVM modifications must also be included since it is needed for the implementation of the dynamic taint propagation tool. The information will be obtained by researching for relevant books, reports and other possible material. Two of the founders of the concept of Domain Driven Security work at Omega-point and are accessible for questions. Conduction interviews with the founders might be of interest.

Chapter 5

Conditions & Schedule

5.1 Resources

No special equipment is needed for the project. But to save some time will the development of the dynamic taint propagation tool continue on the work that Simon Tardell have started. But depending on the direction of the thesis might a, or more, already existing program implemented on the JVM be needed. They can be used to evaluate the dynamic taint propagation tool to see if we can find vulnerabilities in them.

5.2 Limitations

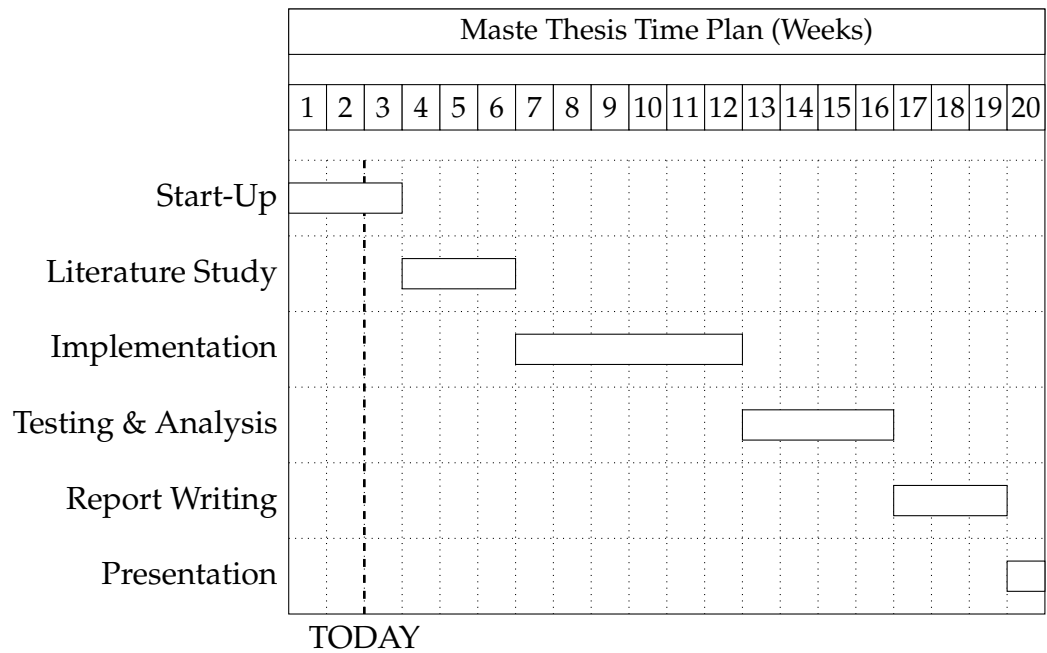
The dynamic taint propagation tool is to backup the report and dose not have to be a production ready tool. It should be a proof of concept.

5.3 Company Supervisor

- **Simon Tardell:** Is my supervisor in the technical parts of the thesis. He's also constructed a first draft of the dynamic taint propagation tool which I am free to use.
- **Jonatan Landsberg:** Will assist with supervision on the academic part if the thesis.

5.4 Time Plan

Below is my time plan for the Masters Thesis. The goal is to continuously, through out all the phases, add to the report. But I've also reserved a couple of weeks in the end for writing the report. I believe that this time can be used to add to, rewrite sections if needed.



Bibliography

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- [3] Dan Bergh Johnsson. *Dear Junior - Letters to a Junior Programmer: Introducing Domain Driven Security*. 2009. URL: <http://dearjunior.blogspot.se/2009/09/introducing-domain-driven-security.html> (visited on 01/25/2018).
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- [5] Johan Wilander. *OWASP Sweden: Domändriven säkerhet / Domain-Driven Security*. 2009. URL: <http://owaspsweden.blogspot.se/2009/09/domanddriven-sakerhet-domain-driven.html> (visited on 01/25/2018).