UNIVERSITI TEKNOLOGI PETRONAS

Bio-Inspired Mechanism For Securing Distributed Networked Component Based Software

By

Oumar Abderaman Mahamad Abbo

A THESIS

SUBMITTED TO THE POSTGRADUATE STUDIES PROGRAMME

AS A REQUIREMENT FOR THE

DEGREE OF MASTER OF SCIENCE (MSc)

IN INFORMATION TECHNOLOGY

BANDAR SERI ISKANDAR,

PERAK,

November, 2009

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ABSTRACT

Distributed Networked systems and applications are created by composing a complex set of component-based software. These components are subject to continuous upgrade, replacement, and scaling, and also anomaly attacks. These conditions must be monitored and controlled in order to have these behaviors seem normal and routine.

Self-regenerative systems are new and software paradigm in survivable system design. Self-regeneration ensures the property that a system must have and cannot be vulnerable to external factors and fail. In order to establish the utility of self-regenerative capability in design of survivable systems, it is important to ensure that a system satisfying the self-regenerative requirement is survivable.

Studies have been carried out to build self-regenerative systems using multi agent paradigm in order to ensure network software survivability, and a secure system. In this thesis, the architecture based on distributed concept and cell regeneration system is presented. To ensure that the system satisfy the self-regenerative requirements, the model support and execute its mission in the presence of attacks, by implementing the multi agent system. The concept of an agent provides a convenient and powerful way to describe a complex software entity that is capable of acting with a certain degree of autonomy in order to accomplish tasks on behalf of its user, multiple agent are implemented for robustness.

Our model consists of four agents. The first agent will perform the monitoring and detection of any malicious activities by observing behavior of the attack. The second agent will be activated from the action of replications of the component,

and the third agent will carry out the prevention of attack. The fourth provide routing management services. Result has been generated by implementing and developing the four agents as a standalone by JADE (java agent development framework).

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