UNIVERSITI TEKNOLOGI MARA

IMPROVING WEB SITE AVAILABILITY USING
MATHEMATICAL MODEL (PSM) AND CACHING SCHEME

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Thesis submitted in partial fulfillment
of requirements for the degree of

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Candidate's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of University Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification. In the event that my thesis is found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree to be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

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Abstract

Web caching has been proved to be a highly efficient method in reducing the network bandwidth consumption, as well as decreasing the network's latency. In a web cache placement strategy, an important issue is to utilize the available resources by performing a cache placement to achieve the desirable scalability. The current study has tried to explore the scalability improving strategies by taking advantage from the distributed cache placement technique. Therefore, a Finite Series Model (FSM) was introduced to analyze the hit ratio saving resulted from the copies made in the cache for the requested objects. By using this model, the scalability problem can be formulated as a function of the object requests that hit the server successfully. It was proved that the hit ratio for a single object on the origin server along adopted cache schemes follows the finite series functions. As a result, it was possible to achieve the mathematical solution by using such series. The scalability estimation and assessment was then proved by performing a case study to compare the actual data against the abstracted ones.

Performance of the cache strategies were evaluated by considering the case study and taking advantage from the real workload traces. It was shown that both the client and the distributed caches performed well in the case study.

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