



Senior Design Project

A Minimum-Cost Flow Model for achieving fault-tolerance in Web Application on Cloud using Spot Instance.

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LETTER OF TRANSMITTAL

12th September, 2019

To

Prof. Dr. K. M. A. Salam

Professor and Chairman,

Department of Electrical and Computer Engineering,

North South University, Dhaka.

Subject: Submission of Capstone Project on “A Minimum-Cost Flow Model for achieving Fault-Tolerance in Web Application on Cloud using Spot Instance”.

Dear Sir,

With due respect, we would like to submit our Capstone Project Report on “A Minimum-Cost Flow Model for achieving Fault-Tolerance in Web Application on Cloud using Spot Instance” as a part of our BSc program. The report deals with a minimum-cost flow model to use in conjunction with ‘Spot Instance’ for provisioning availability-critical web-application efficiently. We tried our level best to make the report meaningful and informative.

The Capstone project was very much valuable to us as it helped us to gain experience from practical field. It was a great learning experience for us. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you are kind enough to receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,

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APPROVAL

The capstone project entitled “A Minimum-Cost Flow Model for achieving Fault-Tolerance in Web Application on Cloud using Spot Instance” by Inzamamul Haque Rafat (131 1105 043), Faiza Tasmin Tarjee (141 0283 042), Ayesha Siddika Farhana (141 0991 042), Ayvee Nusreen Anika (151 1059 642) and Saadman Musaddic Alam (151 1958 042), is approved in partial fulfillment of the requirement of the Degree of Bachelor of Science in Computer Science and Engineering or Electrical and Electronic Engineering on June, 2018 and has been accepted as satisfactory.

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DECLARATION

This is our truthful declaration that the “Capstone Project Report” we have prepared is not a copy of any “Capstone Project Report” previously made by any other team. We also express our honest confirmation in support of the fact that the said “Capstone Project Report” has neither been used before to fulfill any other course related purpose nor it will be submitted to any other team or authority in future.

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Lastly we are grateful towards all our teachers for guiding us in every steps of life and thankful to our family members for supporting us to work for this project.

ABSTRACT

Cloud providers like Amazon AWS, Google Cloud and Microsoft Azure sell their idle computing capacity at steep discounts through an auction system to maximize the return on investment (ROI). These ‘Spot Instances’ can be used to deploy Web Applications which require high computing capacity and dynamic scaling. Though the Spot-Instance-based approach can reduce cost of Web Application significantly, the management of auto-scaling can be challenging as the ‘Spot Instance’ can be terminated by the provider when the bidding price goes below the market standard rate. We describe here a minimum-cost flow model to use in conjunction with ‘Spot Instance’ for provisioning availability-critical web-application efficiently. Our suggested provisioning system considers real-time prices for Spot Instances based on availability zones, smart Spot Instance selection using application metrics, reversion to the on-demand virtual instance when the price of the Spot Instance exceeds a threshold level. The proposed model was implemented via a simulated framework in AWS. The simulation shows that the proposed model can significantly reduce resource cost and still achieve fault-tolerance in Web Application.

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