**LOAD BALANCING AND POWER MANAGEMENT**

**FOR CLOUD DATACENTERS WITH RENEWABLES**

**A PROJECT REPORT**

***Submitted by***

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**BONAFIDE CERTIFICATE**

Certified that this report titled “**LOAD BALANCING AND POWER MANAGEMENT FOR CLOUD DATACENTERS WITH RENEWABLES***”*, is a *bonafide* work of **SUBHA.R [2014506114], SRINIVASAN. S [2014506113] and AKILAN .V [2014506064]** who carried out their work under my supervision, for the partial fulfillment of the requirements for the award of the degree of *Bachelor of Technology* in *Information Technology*. Certified further that to the best of my knowledge and belief, the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or an award was conferred on an earlier occasion.

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**ABSTRACT**

Cloud Datacenters traditionally used brown energy (e.g., derived from fossil fuel and oil) which directly result in severe harm to the environment. To reduce the carbon footprint , many Cloud Service Providers (CSPs) are exploring the possibility of using renewable energy to operate their datacenters showing a clear trend to migrate towards green cloud datacenters. Green cloud datacenters typically use solar and wind as renewable energy sources. To meet the objectives of highly dynamic user demand and to ensure efficient power management, we propose a dynamic methodology that can perform load balancing and power management for geographically distributed green cloud datacenters. This will help to manage the time-average operating power cost of datacenters while still maintaining user QoS(Quality of Service). Moreover , one of the major causes for power consumption in datacenters is due to task migrations from overloaded VMs .Our objective is to reduce the number of task migrations by choosing the optimal datacenter for execution of the request , thereby reducing the amount of power consumed. To this end, we propose to formulate the problem into a constrained stochastic optimization problem and apply nature inspired algorithms to determine the geographically optimal datacenter to which the request is to be routed. Trace driven simulations are conducted to determine the effectiveness of the algorithm.

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**LIST OF SYMBOLS**

|  |  |  |
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| **S.NO** | **SYMBOL** | **EXPLANATION** |
| 1 | Ε | Eco factor or green degree |
| 2 | Cj(t) | Eco Aware Power Cost |
| 3 | Α | Solar Energy Conversion Efficiency |
| 4 | Β | Wind Energy Conversion Efficiency |
| 5 | λ(t) | Workload |
| 6 | ρ | Air density |

**LIST OF ABBREVIATIONS**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **NOTATIONS** | **ABBREVIATIONS** |
| 1 | CSP | Cloud Service Provider |
| 2 | VM | Virtual Machine |
| 3 | M-BFOA | Modified Bacterial Foraging Optimization Algorithm |
| 4 | QoS | Quality of Service |
| 5 | MIPS | Millions of Instructions per Second |
| 6 | PE | Processing Element |