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Load Balancing and Monitoring For Internet Applications in Clouds

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Abstract: Many Internet applications can benefit from an automatic scaling property where their resource usage can be scaled up and down automatically by the cloud service provider. A system that provides automatic scaling for Internet applications in the cloud environment is presented in our work. Each application instance inside a virtual machine (VM) and use virtualization technology to provide fault isolation is encapsulated. Arrangements are made to model it as the Class Constrained Bin Packing (CCBP) problem where each server is a bin and each class represents an application. The class constraint reflects the practical limit on the number of applications a server can run simultaneously. An efficient semi-online color set algorithm that achieves good demand satisfaction ratio and saves energy by reducing the number of servers used when the load is low is developed. Experiment results demonstrate that the system can improve the throughput by 180% over an open source implementation of Amazon EC2 (Elastic Compute Cloud) and restore the normal QoS (Quality of Service) five times as fast during flash crowds. Large scale simulations demonstrated that the algorithm is extremely scalable: the decision time remains under 4 sec, for a system with 10000 servers and 10000 applications. This is the order of magnitude improvement over traditional application placement algorithms in enterprise environments.