

Empowering Individual Tenant(s) to contribute for Green Cloud Computing

Cloud computing has significantly affected the way IT infrastructure is being consumed. With the help of virtualization technology, it empowers end user to act like a tenant in cloud data center, and to consume computing resources like server, storage and network in software defined way. Energy consumption is a critical issue, whether the goal is to reduce cost, save the environment or keep running virtual infrastructure of a tenant. So far, the ability to save power or to contribute to green environment is left to data center. The power to contribute for saving green environment is not yet considered. There is no holistic cloud solution for a tenant to be able to specify power up/down policies, which can be optimally analyzed by infrastructure service provider for powering up bare minimum physical resources (like servers, networking equipment and storage devices) and hence resulting in saving of energy consumption. Also, there is no way for cloud service provider to transparently pass saved power cost to tenant. For example, tenant would like to specify power policy as 'Power-off virtual infrastructure during night time as he or she does not expect virtual infrastructure to be used'. Infrastructure service provider should optimally analyze tenant specified power policies and power on/off physical resources to save energy without breaking the tenant contract.

Above problem can be addressed by aligning needed physical resources to realize virtual infrastructure. Overall, objective is to keep powered-up bare minimum physical resources to run virtual infrastructure at any given point of time. It can be achieved, if following points can be addressed:

1. End user should be able to define (or configure) power policies in software defined way either at the time of provisioning virtual infrastructure, and/or at any point of operational lifetime of virtual infrastructure
2. Infrastructure service provider should be able to analyze up time (or power-up) requirement of virtual infrastructure for end user(s): (1) Determine optimal physical resources needed to realize virtual infrastructure, (2) Move virtual resources across physical resources appropriately, if needed and (3) perform power operation on physical resources like shutting down physical servers, spinning down hard disk, etc.

