Infrastructure Power Management System “PowerMan”
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Introduction and Background

- Nutanix is a cloud computing company that offers a variety of services for on-prem and hybrid cloud deployments.
- Nutanix offers a disaster recovery service, Xi Leap
- Xi Leap utilizes Nutanix own data centers to provide reliable storage for disaster recovery
- Presently, the Nutanix data centers do not have a central solution for power management in their data center
- To perform even a trivial power cycle operation, they must file an IT ticket, which is costly in terms of time and human labor.
- There are many equipment vendors with unique interfaces.

System Requirements

- Nutanix is looking for a service that can remotely control and monitor power distribution in their many data centers.
- The proposed system will provide an API which is capable of performing various query and control operations on power distribution units (PDUs)
- The system shall provide a single API which is capable of interacting with PDUs from different vendors
- The system shall utilize an authentication mechanism to ensure that only authorized users can control the PDUs remotely
- The system should cache redundant queries to conserve bandwidth and to reduce PDU downtime
- The system should switch multiple outlets in a controlled manner, so as not to exceed the PDUs peak power limitation.
- The system should be able to scale to thousands of hosts.

Implementation

- Our system is designed as a microservices type application, which utilizes Docker and Kubernetes to provide workload isolation and scalability.

- The Kong API Gateway serves as an Ingress Controller to our Kubernetes cluster, and handles request authentication and validation
- The Core Service is a Golang application which is responsible for maintaining the state of the system using a MySQL database, and forwarding requests to the appropriate handler.
- The PDU Service is a Python Flask application which is responsible for translating the API request from the uniform API to the vendor specific API, sending the request to the PDU, and processing the response.

Future Development

- Prometheus Alertmanager can be used to notify site engineers of any issues with power distribution, such as excessive load.
- The PowerMan API can be used in future data center automations.
- For example, the power consumption information can be used to intelligently scale applications by switching racks or single nodes.
- The data can also be used to generate a heatmap for visual analysis.
- PowerMan can be extended to support additional PDU vendors.
- Okta integration is planned, which would allow for role-based access.

Conclusion

- Our team was successfully able to implement the proposed system by developing on a local Kubernetes cluster. The application is able to process incoming requests, securely communicate with devices in the Nutanix data center, and return a response to the user.

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