

VMware Tanzu POC for ReBIT

PoC Prerequisites and Preparations Guide



Contents

1	Purpose.....	4
2	VMware Tanzu Solution Overview	4
3	ReBIT Application Details	6
4	PoC Use Cases & Scope	7

1 Purpose

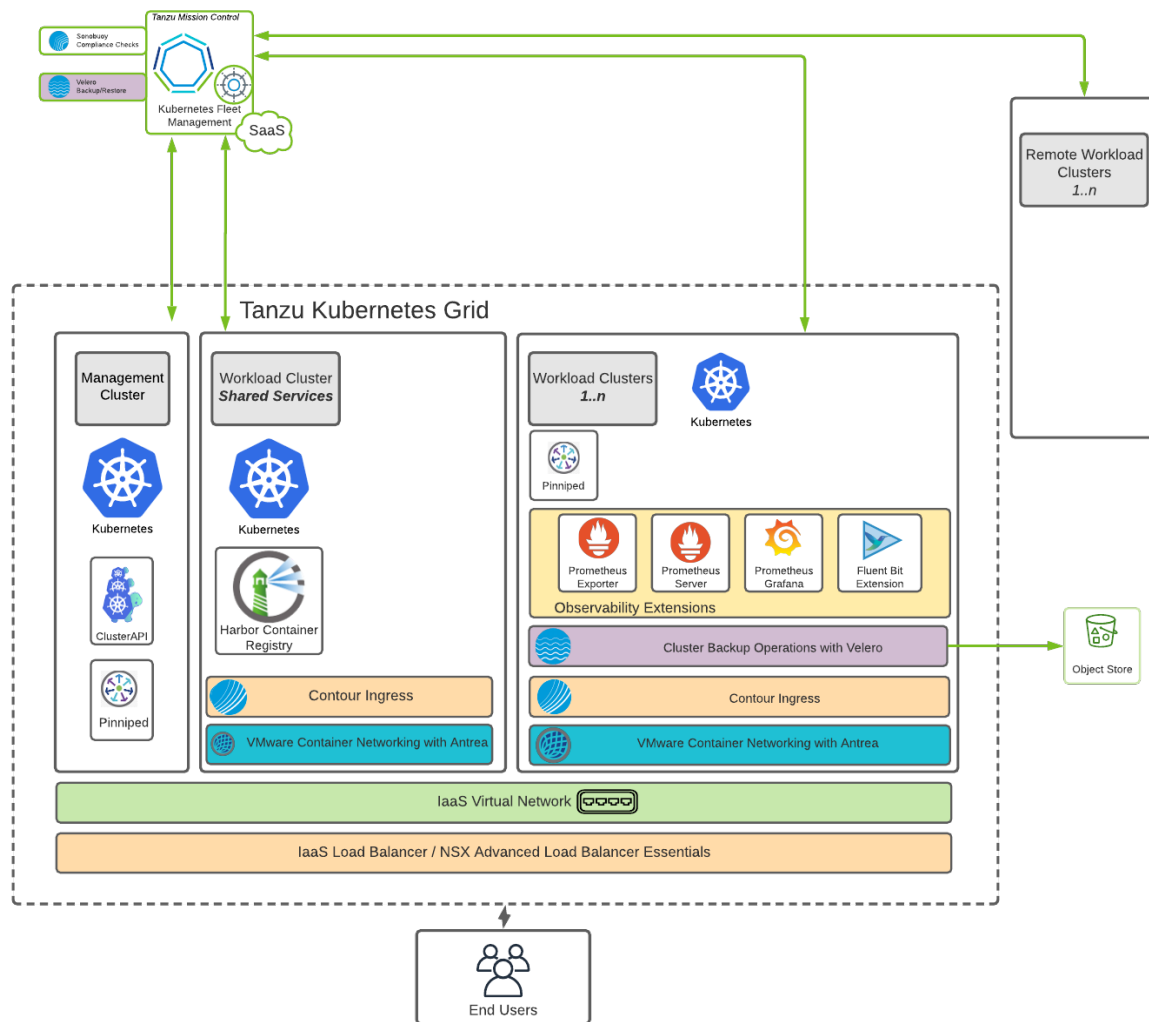
PoC Purpose

ReBIT team have developed few micro services using open source technologies as part of creating an Application Modernisation Roadmap for RBI's legacy monolithic applications. Currently these services are developed and tested using Docker tools and deployed on Docker Swarm. As part of this PoC ReBIT team want to deploy these application modules on Tanzu runtime (Tanzu Kubernetes Grid) and test platform capabilities for deploying modern cloud native micro services.

2 VMware Tanzu Solution Overview

Introduction to VMware Tanzu

VMware Tanzu simplifies the operation of Kubernetes for multi-cloud deployment by centralizing management and governance for many clusters and teams across on-premises, public clouds, and edge. It delivers an open-source aligned Kubernetes distribution with consistent operations and management to support infrastructure and app modernization. This document provides a high-level architecture for deploying Tanzu editions. It also provides links for infrastructure provider specific reference architectures.



VMware Tanzu Kubernetes Grid - Enables creation and lifecycle management operations of Kubernetes clusters.

Contour Ingress Controller - Provides layer 7 ingress control to deployed HTTP(S) applications

NSX Advanced Load Balancer Essentials - Provides layer 4 service type Load Balancer support, recommended for vSphere deployments without NSX-T, or which have unique scale requirements.

Harbor Image Registry - Provides a centralized location to push, pull, store, and scan container images used in Kubernetes workloads. It also supports storing many other artifacts such as helm charts and includes enterprise grade features such as RBAC, retention policies, automated garbage clean up, and docker hub proxying among many other things.

VMware Tanzu Mission Control - Provides a global view of Kubernetes clusters, and allows for centralized policy management across all deployed and attached clusters.

Pinniped - Pinniped is an authentication service for Kubernetes clusters. This tool provides integration with identity providers such as OKTA, Dex and any LDAP identity provider.

VMware Tanzu Observability Extensions

- **Fluent bit** - provides export log streaming of cluster & workload logs to a wide range of supported aggregators provided in the extensions package for Tanzu Kubernetes Grid
- **Prometheus** - provides out-of-the box health monitoring of Kubernetes clusters
- **Grafana** - provides monitoring dashboards for displaying key health metrics of Kubernetes clusters

3 ReBIT Application Details

The following micro services has been created by ReBIT to be deployed on Docker Swarm setup.

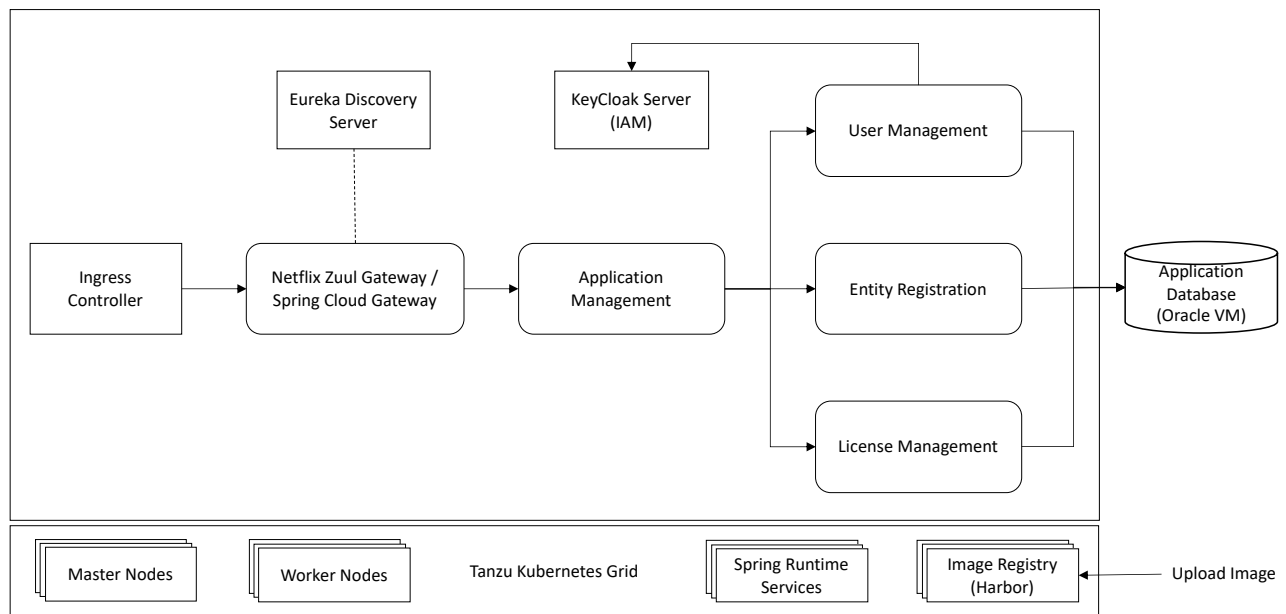
1. **Discovery Service** - Currently this micro service is using Netflix Eureka service for service discovery and registry. Though this service can be deployed and tested on Kubernetes environment VMware suggest to leverage native Kubernetes capabilities for service discovery.
2. **API Gateway** - Implemented using Netflix Zuul and used as (1) Gateway & proxy to backend services (2) used for API authentication /authorization, rate limiting and other common validations. VMware suggest to replace this module with Spring Cloud Gateway for Kubernetes
3. **Application Management** – This is a front facing service for most of the *apconnect system* services as a Façade pattern.
4. **Registration** – A front facing service with UI. UI part is implemented in Angular and this service is responsible for registering entries to the *apconnect system*.
5. **License Management** – Another front facing application that will provide required licenses to registered entities to the *apconnect system*.
6. **User Management** – This service used for connecting with the authentication and authorization service (keycloak). For PoC purpose VMware is suggesting to continue using keycloak. Tanuz Kubernetes Grid can be integrated with any LDAP / OIDC provider.

The application code for the above micro services has been developed by ReBIT Application Owners and container images are created using docker tools. These are ready to be deployed on a Kubernetes cluster with the required configuration changes.

Following are the key points application architecture details discussed:

1. The container images would be provided by ReBIT and uploaded to the docker registry
2. The microservices would be deployed as stateless containers
3. File Storage services would be made available for the containers using NFS PV
4. The Discovery Services deployed for Docker Swarm would need to be redeveloped for Kubernetes
5. An external Oracle 19c Database would be used that would be deployed on VM
6. The existing application is tested on Docker platform with the following configuration 3 Master and 3 Worker nodes with 8 vCPU and 16GB RAM each
7. In the current application Spring Boot 2.3.0 would be used
8. There aren't any caching or messaging solutions used, instead APIs are used.
9. JWT Token is used for microservices security

Below diagram depicts the high level application architecture and its components



4 PoC Use Cases & Scope

The following use cases has been shortlisted for this POC:

Setting up Tanzu Kubernetes Grid & Application Dependencies for POC
<ul style="list-style-type: none"> Review of Customer Goals/Objectives for the PoC Architecture Whiteboard Discussion Infrastructure Readiness Verification Install NSX-T, Verify MTU Path Consistency, and Integrate Static/BGP routing with Physical Network Deploy and Configure TKG management cluster and couple of workload clusters Deploy keycloak / IAM system for PoC Setup Harbor Registry Deploy Oracle 19c Database
Test Cases to be Validated
<ul style="list-style-type: none"> TKG Platform <ul style="list-style-type: none"> Create and Assign Roles for Platform Operator User(s) with IAM system (keycloak or any other OIDC /LDAP) Verify Platform Management and Control Plane Deploy Kubernetes Test Cluster and Verify API Access Create cluster, resize cluster, delete cluster and Show VM life cycle beneath K8s layer Create Custom Namespaces and Deploy PoC Sample Application(s) Scale-out Kubernetes Cluster and Induce Fault Recovery Delete Test Cluster and Observe Clean-up Process Summarize and Conclude On-Site PoC Activities (Abbreviated PoC Only)
Application Testing
<ul style="list-style-type: none"> Modify the required services and rebuild container images Create the required Kubernetes deployment descriptors and define ingress mechanism Deploy the application on a TKG workload cluster Check the Services status of the applications deployed as containers Execute standard Test Cases for testing an application on TKG POC Demonstration to Customer Stakeholders Summarize and Conclude On-Site PoC Activities

The table below summarizes the next steps required to continue with the POC

Task	Owner
Rebuild the Discovery Service to leverage native K8s capabilities	ReBIT
Replace Zuul with Spring Cloud Gateway	ReBIT & VMware
Provide an access to public registry for ReBIT to upload the container images	VMware
Upload container images to the registry	ReBIT
Setup Tanzu Kubernetes Grid Cluster	VMware
Deploy Oracle 19c on VM	VMware
Use Scripts to populate the Database	ReBIT
Test the applications deployed as containers on TKG runtime	VMware & ReBIT
Test the platform capabilities	VMware & ReBIT

General Responsibilities

The following two sections outline the general responsibilities and expectations.

VMware	<p>The scope of the PoC is limited to the following tasks:</p> <ul style="list-style-type: none"> System conceptual architecture white-boarding and technologies deep-dive discussion, specific to TKG use cases
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	<ul style="list-style-type: none"> • Evaluation infrastructure planning guidance, configuration support (limited), and remote readiness verification • At the discretion of VMware, on-site or remote installation and integration of the VMware products sub-systems below: <ul style="list-style-type: none"> ◦ VMware Tanzu Kubernetes Grid ◦ VMware Harbor ◦ VMware Network and Security Virtualization (NSX-T) ◦ VMware vRealize Operations, LogInsight • Support the operational validation test and evaluation process of Tanzu Kubernetes Grid (TKG) runtime • Guidance to ReBIT developers to make the required changes to the application.
Customer	<p>VMware expects the Customer to be responsible for the following tasks:</p> <ul style="list-style-type: none"> • Application redevelopment to work on Kubernetes • Provide container images for the micro services identified for this POC • Setup the Database requirements for the application • Support VMware with the requirements elicitation and analysis process • Provide facilities (i.e., conference room, whiteboard, projector, etc.) and access to the Internet and system environment • Commit technical resources to supporting the preparation, implementation, and evaluation of the system throughout the complete duration of the PoC • Support VMware with the development of validation test cases • Participate in PoC debriefing and provide feedback to VMware on the outcome