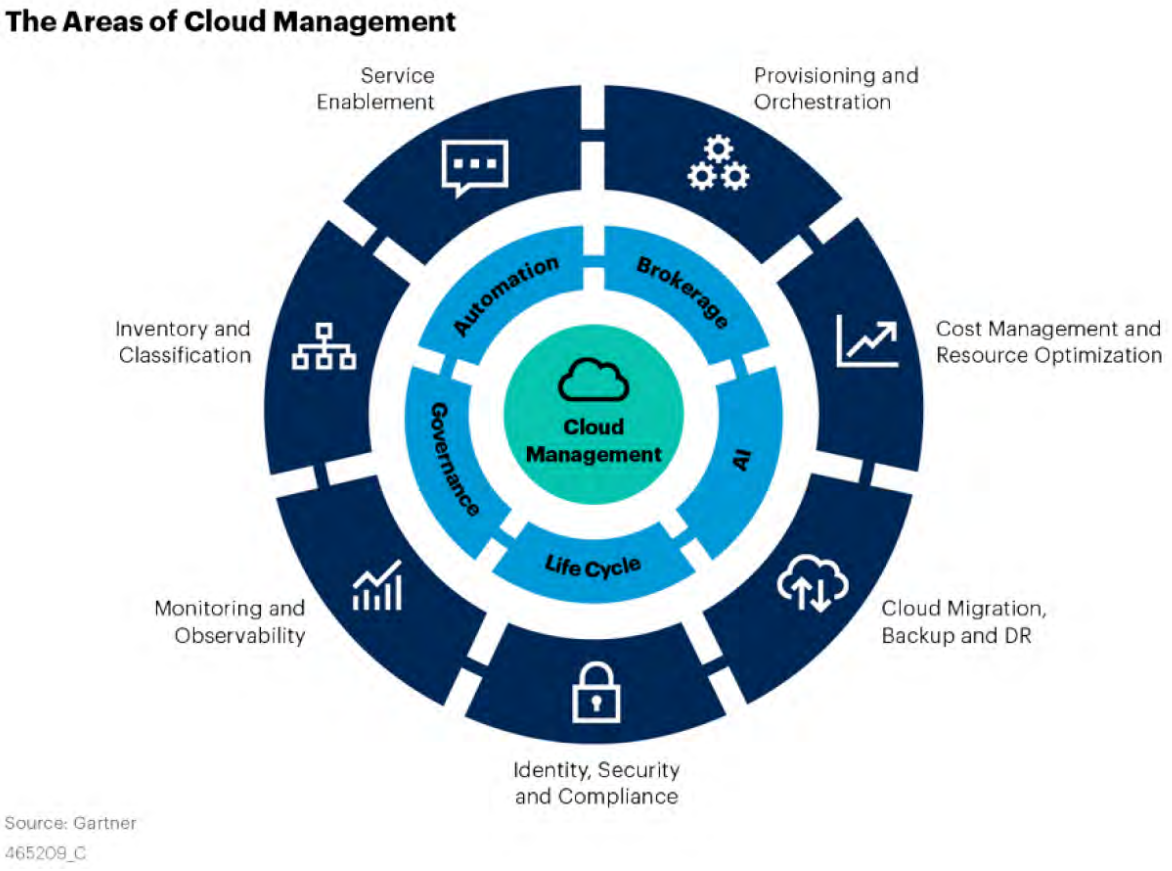
Last Updated: September 2023
Morpheus v6.x

Overview

Gartner, Inc. has provided a useful framework for evaluating criteria for assessing various elements of cloud management tools for private, hybrid, and public cloud IaaS and PaaS offerings. (Solution Criteria for Cloud Management Tools: ID G00465209)

This document describes the Morpheus feature set within the context of the Gartner rubric criteria and can be useful to better understand the feature/function mapping and potential areas of the stack to control through RBAC and Policy. The end of the document lists individual feature elements, integration categories, and clouds that Morpheus can connect into as well as details on the core product architecture.



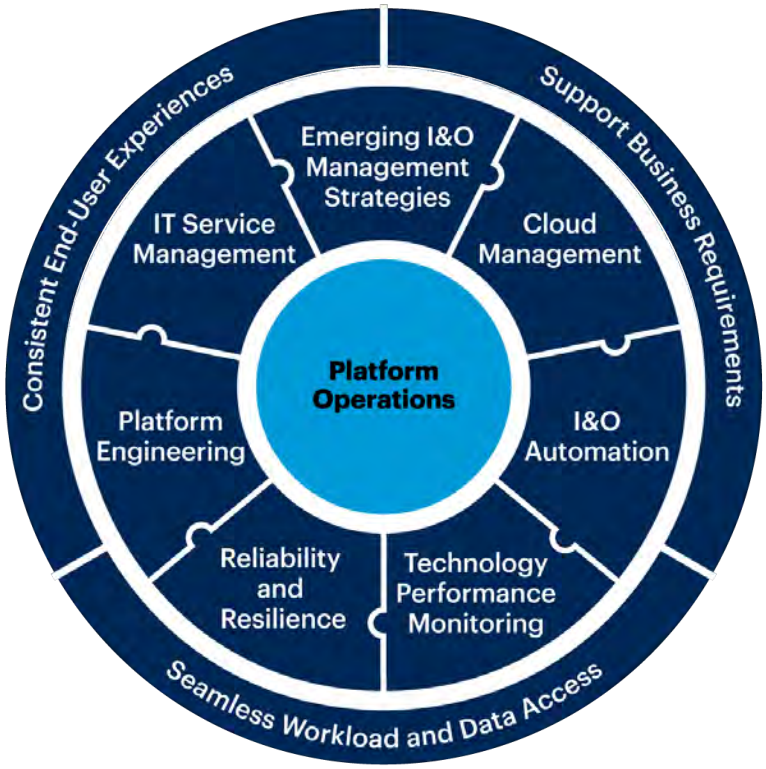
The Rise of Platform Operations

While Morpheus is proud to have been named a Leader in Cloud Management Platforms and highlighted in over a dozen market guides and hype cycles, we believe that the classic CMP definition has always represented only a subset of customer need.

Over the last 18 months, Gartner has come to the same conclusion as Enterprises adopt a platform and product mindset within IT. Gartner themselves has predicted that “by 2025, 75% of organizations with platform engineering teams will provide self-service, internal developer platforms to improve developer experience and accelerate product innovation”.

Morpheus has long represented the intersection of cloud management, I&O automation, IT service management, and platform engineering, making the platform an ideal fit for modern enterprises looking for a sustainable approach to unified platform operations.

Infrastructure, Operations and Cloud Management



Source: Gartner
758929_C

Source: Gartner Infrastructure, Operations and Cloud Management Primer for 2022, Published 4 February 2022

Provisioning and Orchestration

The tasks to create, modify and delete resources and to orchestrate provisioning and management workflows.

Morpheus offers a wide range of customizable options to trigger provisioning, CRUD operations, and orchestrate automation workflows suited for different user types and levels of organizational maturity. These include a simple 'shopping cart' portal, a power-user portal with advanced options, a full-fidelity open API/CLI, Jenkins plug-in for use in CI/CD pipelines, cloud-native infrastructure-as-code blueprints (CloudFormation, ARM, Terraform) for 'southbound' IaC, Morpheus Terraform provider for 'northbound' use from TF, and a native plug-in for ServiceNow so catalog items can be requested via NOW. Any of these mechanisms can be used to provision into our 20+ supported on-prem and public cloud endpoints including support for Bare Metal, VMs, Containers, Clusters, and cloud-native PaaS. Orchestration templates and micro-templates can be tied to Git SCM for versioning and shared access and can include code artifact deployment. Provisioning workflows can be explicitly or implicitly attached to catalog items with phased-based automation attached to the lifecycle of that instance (pre-provision, provision, post provision, start / stop, code deploy, reconfigure, teardown, etc.). Morpheus offers native Docker and Kubernetes cluster management, integrated management of cloud-native K8s stacks (AKS, EKS, GKE), and can connect to brownfield K8s clusters. All provisioning and orchestration activities fall within the fine-grained RBAC and Policy Engine.

Service Enablement

The tasks to collect and fulfill requests from internal cloud consumers to deploy cloud resources or enable access to cloud services.

Users can request and access services and resources via catalog and orchestration template mechanisms described under Provisioning and Orchestration. Additionally, operational workflows can be exposed as XaaS catalog items with input fields to perform a wide range of tasks including landing zone configuration, account creation, and more. These XaaS items are not VM/Compute based instances yet can still have phase-based automation attached to facilitate cloud service lifecycles. Policies can be optional or mandatory and can be scoped to tenants, clouds, groups, roles, or users and cover budgets, approvals (native or customized via ITSM), resource limits, budgets, lifecycle, and dozens more. Application catalog instances are crafted at the service level and can then be modeled across any platform and cloud such that a single service can support any number of templates and layouts including support for complex configurations such as master-slave relationships in clustered services as well as mixed modality services spanning VM/IaaS, cloud-native PaaS services, custom AMIs, Kubernetes specs and HELM charts, etc. Deep ITSM integration with ServiceNow, Cherwell, and Remedy includes catalog access, approvals, CMDB CI-record updating, and incident management.

Containers and Kubernetes

Container management is a category of software or cloud service solutions that includes container runtimes, orchestration and scheduling, resource management, delivery and management middleware, and other container management capabilities.

The original Morpheus use case as an internal project at Bertram Capital was designed around docker container orchestration so many of the core services and primitives have been well suited as the broader market has embraced Kubernetes. Today, the platform provides orchestration of both Vendor Managed and Self-Managed Kubernetes clusters including its own CNCF-certified Morpheus Kubernetes Service (MKS) and third-party solutions such as OpenShift, Rancher, Tanzu, EKS, AKS, and GKE. Integrations into common networking, compute, storage, ITSM, and other technologies can simplify the self-service provisioning of Kubernetes clusters while the unified Morpheus interface has been enhanced to simplify management of clusters particularly for IT operators without deep Kubernetes expertise. For hybrid and multi-cloud needs, MKS can be deployed to any on-prem or public cloud to enable consistency of operation across end points. For edge location needs the Morpheus Distributed Worker can be used to automate deployment of micro-distributions such as K3s, K0s, and others. Morpheus has for a long time included native ability to provision images from private and public container registries including Harbor, Artifactory, Quay, GitLab, etc. Lastly, Morpheus supports Service Mesh by including an embedded Istio package within MKS or can utilize automation to integrate with other options such as Kuma or Consol.

Monitoring and Observability

The tasks to monitor health and performance metrics, collect and store logs, generate distributed traces, manage events, and trigger alerts.

All cloud resources are regularly synchronized every 5 minutes with options to adjust timing thresholds this includes discovery and sync of instances as well as other resources including networks, storage, etc. Detailed metrics are collected both from clouds themselves as well as via the optional Morpheus agent which can often provide more granular OS level statistics for performance, storage, CPU, memory, and network traffic as well as comprehensive log aggregation and remote console access. Third-party monitoring and logging integration is provided to bootstrap agents and forward logs or automation scripts can be triggered to connect to other third-party tools. Additionally, the extensible Morpheus plug-in framework has been used to add custom UI-tab extensions and reports to visualize observability data from AIOps tools like DataDog, OpsRamp, and others. Remediation of events flagged by these platforms can include triggers of Morpheus operational workflows executed against Morpheus managed workloads. Built-in application-level availability monitoring checks can generate reports and trigger incident alerts with variable severity levels for individual instances or for complex multi-tier applications. Alerts can include notification into ServiceNow, Slack, VictorOps, and other tools. Reports and dashboards are available natively, can be exported, can be extended with custom report plug-ins, or data schema can be directly connected to tools such as PowerBI or Tableau.

Inventory and Classification

The tasks to discover and maintain an inventory of cloud resources as well as the ability to monitor change and manage configurations.

Upon attaching Morpheus to a supported cloud endpoint, Morpheus can inventory all existing resources in that cloud and will continue to synchronize any changes on a near real-time basis for provisioned resources. Discovered brownfield inventory as well as Provisioned workloads can include population of customizable CI records in ITSM CMDBs such as ServiceNow. Morpheus will discover and monitor installed software packages on all cloud resources. Utilizing that discovered software inventory, Morpheus can synchronize SCAP packages, scan for CVEs and compliance against STIG guidelines to then provide reports for remediation. The Morpheus policy engine includes mechanisms to enforce configuration policies and enable continuous tag compliance. Tags can then also be used to drive navigation context, reporting, budgets, and other capabilities.

Cost Management and Resource Optimization

The tasks to manage budgets, track and optimize spending and align capacity to workload demand.

Usage and cost metrics are gathered for all on-prem and public cloud resources, but Morpheus also downloads and aggregates the full detailed public cloud invoices for use in reports including time-series analysis, RI and Savings Plan recommendation, forecasting, cloud migration planning, and more. This data is also utilized by the Morpheus Guidance engine for rightsizing and remediation including setting of power schedules or deleting long term idle resources via GUI or API. Guidance engine can be customized for historical date range used for analytics as well as %-age up-size and down-size for CPU and Memory and can be applied to both VMs and Containers. Hard or soft-limit budgets can be set by policy for tenants, clouds, groups, roles, and individual users for reporting, management, and alerting. Policies can also be set for expiration, power scheduling, max resources, and quotas to help manage costs. Pricing and plans within the cost management engine are fully customizable including percentage or fixed cost markup, software license cost overhead, resource granularity, and more. Pricing plans includes support for EA/CSP plans in public clouds with those APIs. Pricing plan comparisons are available at provision time to inform best execution venue or post provision in the form of migration planning reports. Morpheus has native auto-scaling for consistency across clouds or can provide access to cloud-native scaling engines. Multi-currency is supported at the tenant level and includes integration with currency exchange providers.

Cloud migration, backup and DR

The tasks to replicate data to migrate workload, implement business continuity (BC) or disaster recovery (DR) architectures, or protect data against accidental deletion or malicious activity.

With Morpheus, self-service backup and restore is available for storage, files, compute instances, and application stacks via Morpheus snapshots, cloud-native snapshots, and integration into best-in-class backup tools like Veeam, Rubrik, Commvault, etc. as well as replication technologies such as Zerto. Migration planning reports are available with filtering by tenant, cloud, tag, group, and other criteria. Limited image conversion and migration capabilities are available however for large scale bulk migration we guide customers to use a dedicated migration tool or build Morpheus automation workflows that can call cloud-native migration services such as AWS CloudEndure. Application instances can be easily modeled for re-platforming as the library builder supports a range of node and technology types within a single service definition.

Identity, security, compliance

The tasks to manage and secure access to cloud services and to enforce a security configuration baseline.

Morpheus supports cloud platform SSO as well as integration into a wide number of Identity Providers and utilizes those mapped roles to drive RBAC access and policy for the entire Morpheus platform both GUI and API. Security Scan Jobs allow users to create and schedule SCAP program (Security Content Automation Program) scans for groups of managed systems and displays that information in security dashboards. Many customers use Morpheus in concert with HashiCorp Packer to manage golden image templates and assure use of a consistent security standard. For post provisioning security, audit logs are available for all user and system events. Deeper integration with networking services such as NSX and Unisys Stealth enable zero-trust implementations and identity-based microsegmentation and network policy enforcement. Morpheus has policies that map to NIST 800-53 and is actively building out compliance with other frameworks. The built-in Morpheus Cypher service enables robust encryption key management and utilization of those keys in provisioning and automation workflows. The Morpheus Credential service enables creation of credentials and integration into an external credential store server for easy and secure credential storage and rotation as well as retrieval and use when integrating clouds or writing automation scripts. Morpheus has even provided capability to execute remote Ansible playbooks over a secure socket connection for environments that cannot utilize Ansible native SSH/WinRM utilities.

Morpheus Native Services and Features

- Analytics
- Approvals
- Apps
- Archives
- Automation
- Backups
- Boot services (PXE)
- Cluster Management
- Credential Store
- Cypher Secrets
- Deployments
- Discovery
- Guidance
- Hosts
- Image Builder
- Instances
- Key Pairs
- Library
- Load Balancers
- Logging
- Migrations
- Monitoring
- Multi-Tenant
- Networks
- Pricing & Plans
- Scheduling
- Service Plans
- SSL Certificates
- Storage
- Templates
- Virtual Images
- White Label

Morpheus Third-Party Integration Categories

- Approval Services
- Automation Services
- Backup Services
- Build Services
- CMDB Services
- Code Services
- Deployment Services
- DNS Services
- Identity Services
- IPAM Services
- Load Balancer Services
- Logging Services
- Monitoring Services
- Network Services
- Service Discovery Services
- Trust Services

https://morpheusdata.com/hybrid-cloud-management/codeless-integrations/

Morpheus Supported Clouds

- Alibaba Cloud
- Amazon
- Azure (Public)
- AzureStack (Private)
- Canonical MaaS
- Cloud Foundry
- Cisco UCS
- CloudSigma (plug-in)
- Digital Ocean
- Google Cloud
- HPE OneView
- Huawei
- Hyper-V
- IBM Cloud
- IBM Cloud Platform
- Lumen Cloud
- MacStadium
- Nutanix
- Open Telekom Cloud
- Openstack
- Oracle Public Cloud
- Oracle VM
- OpenNebula (plug-in)
- SCVMM
- Softlayer
- UpCloud
- VMWare ESXi
- VMWare vCenter
- vCloud Director
- XenServer

Architecture

Morpheus is a software-based appliance installable on most major Linux versions (AWS, CentOS, Debian, RHEL, SUSE/SLES, Ubuntu). 16GB VM recommended minimum with 200 GB of shared storage. **Components Include:**

- RabbitMQ (Messaging)
- MySQL (Logistical Data store)
- Elasticsearch (Logs / Metrics store)
- Tomcat (Morpheus Application)
- Nginx (Web frontend)
- Guacamole (Remote console service)
- Check Server (Monitoring Agent for checks)