

# Extending SUSE® Cloud IaaS with PaaS Services

A Reference Architecture for WSO2 Stratos on SUSE Cloud



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While companies move their applications to the cloud to capitalize on the model of instant virtual machine provisioning, IT organizations are seeking that same flexibility for in-house applications to avoid the typical delay associated with setting up a complete development or test environment. The partnership between SUSE and WSO2 delivers a fully-certified and supported enterprise-ready development environment whether deploying in a traditional middleware/operating system or PaaS setting.

WSO2 and SUSE have teamed up to provide validated, enterprise-ready open source Platform-as-a-Service (PaaS) and middleware solutions for on-premise and private cloud deployments. These proven joint solutions are based on open standards, open APIs and open communities to help ensure that prior technology investments are not made obsolete and that new investments are future-proof by a shift to cloud computing. SUSE and WSO2 deliver 100% open source cloud infrastructure plus middleware solutions, giving you the freedom and flexibility to design the solution you need, and to quickly respond to changing business requirements.

By running easy-to-implement WSO2 Carbon middleware and WSO2 Stratos PaaS on top of SUSE Linux Enterprise Server and SUSE Cloud, IT Operations and Enterprise Development can work together to rapidly meet new business requirements in a secure and compliant manner. Based on the WSO2 Carbon framework, WSO2 Stratos is the most complete, enterprise-class PaaS, with support for more core services than any other available PaaS today. When combined with SUSE Cloud's dynamic and flexible cloud infrastructure, developers can deploy applications more quickly, run them efficiently, allow them to elastically scale gracefully, while providing consistent monitoring, governance, and even virtual or real billing.

## Terminology

- **SUSE Cloud:** An enterprise-ready and fully supported private cloud offering based on OpenStack, an open source infrastructure-as-a-services (IaaS) solution offering a cloud operating system controlling large pools of compute, storage, and networking resources throughout a datacenter, all managed through a dashboard that gives administrators control while empowering their users to provision resources through a web interface.
- **WSO2 Stratos:** Complete middleware PaaS, providing capabilities for application and service hosting, integration, business processes, identity management, storage, and more – all the capabilities of the WSO2 Carbon platform – in a self-service, elastic, multi-tenant platform
- **SUSE Manager:** Integrated support for management and monitoring of physical cloud infrastructure and Linux workloads deployed in SUSE Cloud.
- **SUSE Studio:** A web application for building and testing software applications in a web browser. It supports the creation of physical, virtual or cloud-based applications

- **Stratos Controller:** Core services supporting self-service, elastic scaling and control of underlying IaaS layer, and automated network, workload, and artifact distribution.
- **Stratos Foundation Services:** Core platform services available in the system, including security, registry, messaging, logging, storage, task management, and billing.
- **Stratos Cartridge:** A wrapper allowing a runtime product (e.g. WSO2 Carbon middleware) to run “as-a-Service” within the Stratos platform. A cartridge can be architected to support shared-process multi-tenancy, or a single-tenant legacy runtime can be encapsulated for management by the Stratos system.
- **WSO2 Carbon Service Types:** Each WSO2 Carbon family product is available as a cartridge that allows it to be exposed as a multi-tenant service, including Enterprise Service Bus, Application Server, Governance Registry, Identity Server, etc.
- **Multi-tenancy model:** The level of sharing/isolation available for each tenant workload.

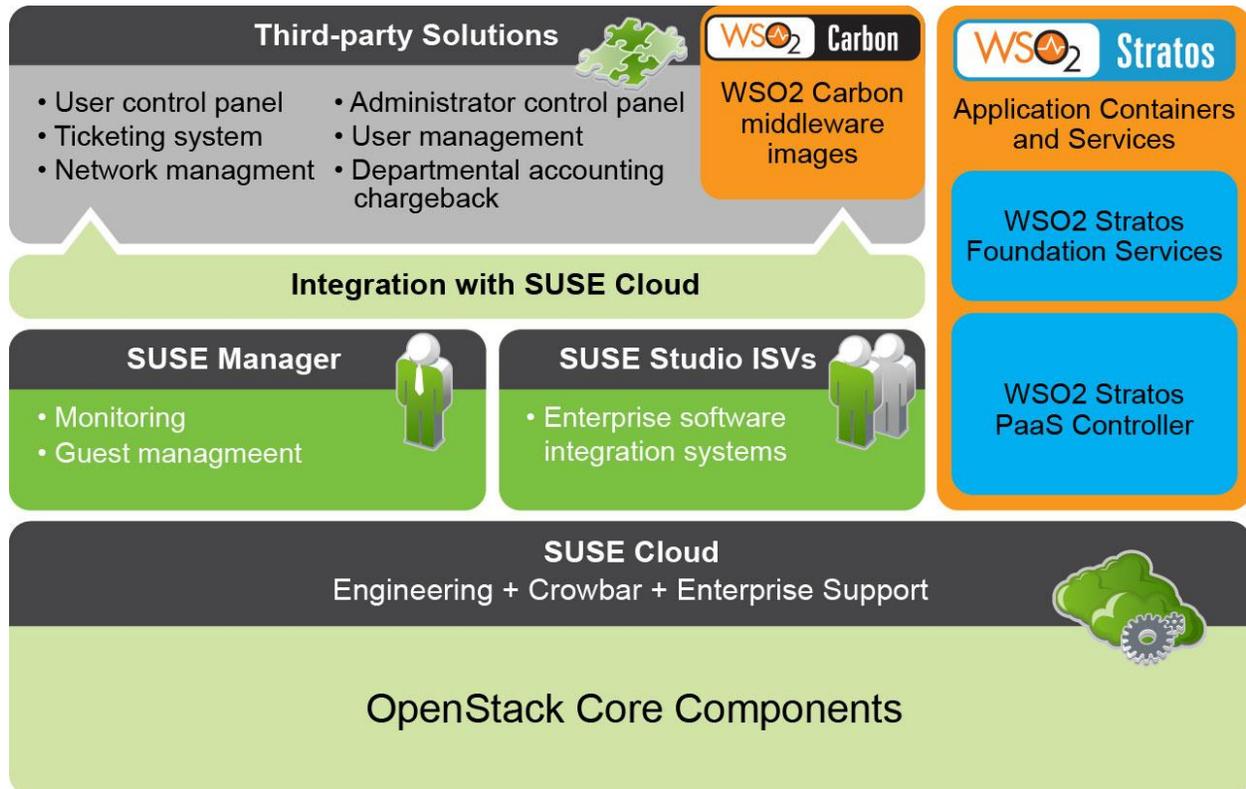
## Reference Architecture Overview

SUSE Cloud and WSO2 Stratos together provide a complete set of benefits from the infrastructure to the application layer, including:

- **Infrastructure virtualization** including increased utilization of hardware resources, improved workload management, resilience to hardware failure, and centralized platform monitoring and governance.
- Instant **self-service provisioning** of virtual machines (SUSE Cloud) or middleware applications (WSO2 Stratos), increasing developer productivity and accountability and increasing the ability of application developers to build competitive advantage.
- Automated **elasticity:** applications deployed on WSO2 Stratos can scale automatically across multiple virtual machines instantiated through SUSE Cloud.
- Applications deployed in WSO2 Stratos can be managed across multiple IaaS infrastructures, such as across SUSE Cloud deployments residing in multiple data centers or bursting loads from the enterprise data center to a public cloud infrastructure (**hybrid clouds**).
- Comprehensive monitoring of internal resources allowing new business models for IT, such as **charge-backs** to consumers of IT services.

## Components

### Stratos / SUSE Cloud Reference Architecture



WSO2 Stratos is a platform as a service offering by WSO2. It includes the full WSO2 middleware components stack which is optimized to run in a cloud environment. WSO2 Stratos can be downloaded and configured to be run on a private cloud within an organization.

The preferred IaaS environment for WSO2 is SUSE Cloud. SUSE Cloud is powered by OpenStack, the leading community-driven, open source cloud infrastructure project. It seamlessly manages and provisions workloads across a heterogeneous cloud environment in a secure, compliant, and fully-supported manner. In this setup, the virtual machines that will be running all the Stratos services, will be running on compute nodes within the SUSE Cloud environment.

The integration between SUSE Studio™ and SUSE Cloud helps you rapidly deploy and adapt applications for use within your private cloud, or in the public cloud of your choosing as part of a hybrid cloud installation. SUSE Studio helps you assemble, build, and deploy portable application stacks into the SUSE Cloud image repository. Since SUSE Studio supports multiple virtualization and cloud platforms,

you can place these applications in both your SUSE Cloud private cloud and a public cloud to run when needed.

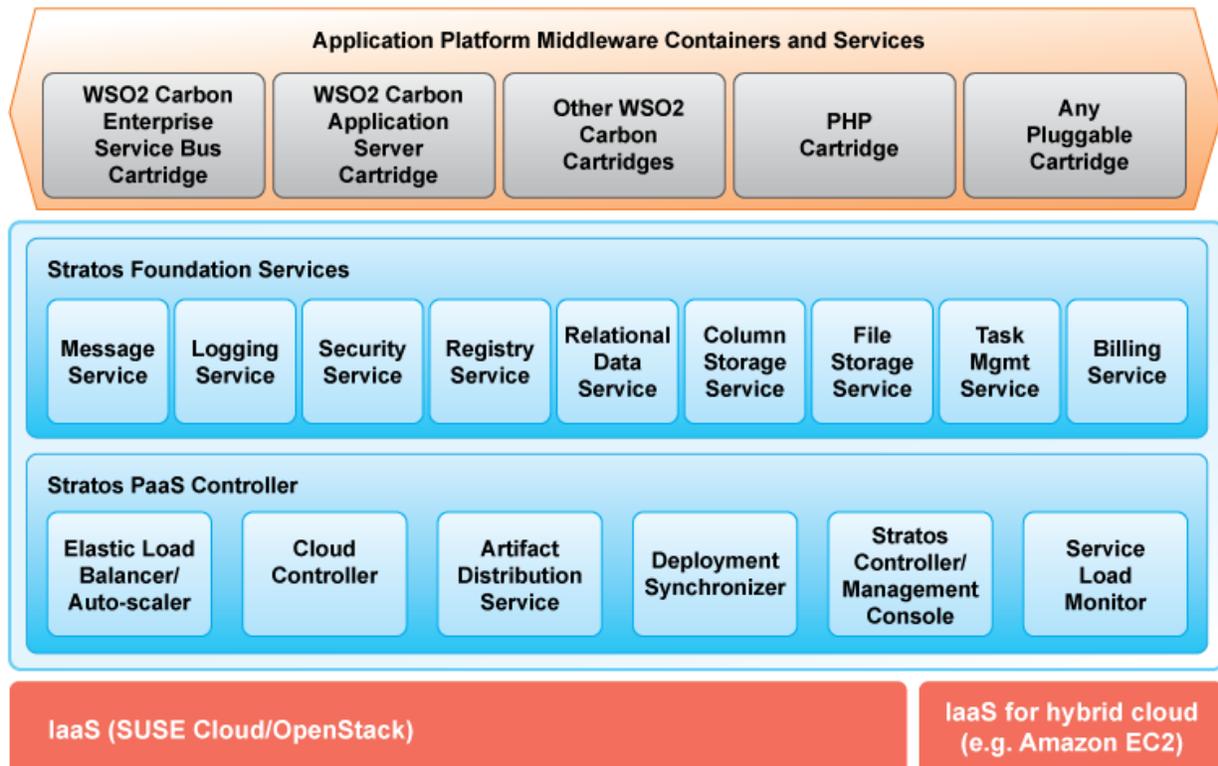
SUSE Manager delivers comprehensive management of guest Linux workloads running in both public and private clouds. SUSE Manager can easily track and maintain thousands of images across cloud boundaries—both private and public. Its advanced patching techniques are critical in helping limit security risks and maintain compliance with internal and external regulations.

Once installed, WSO2 Stratos monitors the service and tenant loads (Service Load Monitor), automates the instantiation and destruction of VMs (the Cloud Controller), the provisioning of the required Service Type and the tenant's application artifacts to the new VM (Deployment Synchronizer, Artifact Distribution Service), and routing of traffic to the correct instance (tenant-aware Elastic Load Balancer.) The Stratos Controller also provides a Management Console for the PaaS allowing the provisioning of tenants and tenant workloads.

Tenant workloads (applications) are deployed as code/configuration bundles into the tenant's domain within the Service Types provided by the platform. These applications can also take advantage of services such as logging, monitoring, billing, storage of various flavors, security and identity, registry, task management, and messaging that are provided as foundational services by the Stratos PaaS.

Note that WSO2 Carbon middleware products can also be installed as standalone (non-elastic) servers on VMs provisioned by SUSE Cloud. Refer to the installation guides for installation instructions.

### Stratos 2.0 Architecture



## SUSE Cloud Installation and Preparation

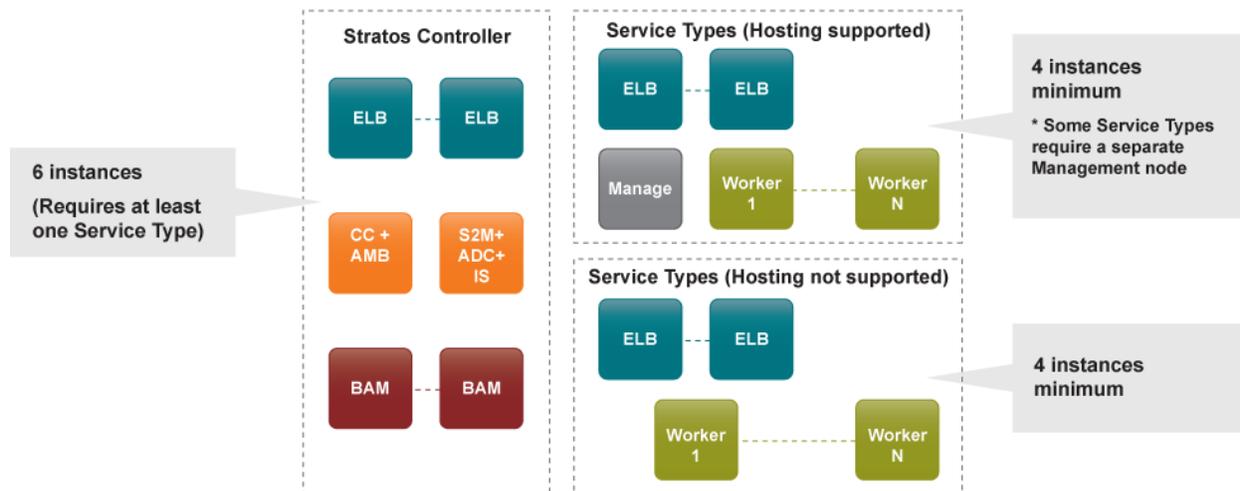
Initial deployment of SUSE Cloud requires a minimum of three physical machines. Detailed information regarding the deployment of SUSE Cloud and all hardware and software requirements can be found online in the [SUSE Cloud Deployment Guide](#).

## WSO2 Stratos installation

This architecture proscribes WSO2 Stratos 2.0, which is available for [download](#) at from early June 2013.

WSO2 Stratos is deployed as a set of required Java Virtual Machines (JVMs) into virtual machines provisioned through SUSE Manager.

### Stratos Minimum Deployment



Best practice recommendation for planning an installation includes:

- Typical enterprise application development scenarios include the most popular Service Types in the core installation. We recommend installing the following Service Types by default:
  - Enterprise Service Bus
  - Application Server
  - Governance Registry
  - Identity Server
  - Data Services Server

- Storage (one or more of Column Storage Service, Relational Storage Service, or File System Storage Server)
- In addition, users may take advantage of additional Service Types:
  - API Manager
  - Business Activity Monitor
  - Complex Event Processing Server
  - Business Process Server
  - Business Rules Server
  - Message Broker
  - Gadget Server
  - Third-party services available in cartridge form (e.g. PHP)
- We recommend starting by simple re-theming of the PaaS for your internal usage, as well as inserting company logos and other branding information through an alternate stylesheet deployed in the Stratos Controller.
- Determine provisioning entitlements. Self-provisioning of new tenants (with email verification) is enabled by default. This may be disabled if manual tenant approval and provisioning by a super-tenant (sys admin) is desired.

## Installation Instructions

Step-by-step installation of WSO2 on SUSE Cloud is described in "[WSO2 Stratos Deployment on OpenStack](#)"; complete Stratos documentation is available [here](#).

For demonstration and evaluation deployment Stratos can run completely within one node with 8GB minimum RAM. Initial production deployment involves configuring at least three virtual machines – Cloud Controller, Elastic Load Balancer, and Stratos Controller nodes, plus a virtual machine for each Service Type. The Cloud Controller will scale additional virtual machines as needed (and within policy) based on utilization rates and the tenancy model configuration in effect.

## Get Assistance and Learn More

For more information on SUSE Cloud, please visit the [SUSE Cloud web page](#). For more information on WSO2 Stratos, please visit the [WSO2 Stratos web page](#) or [contact WSO2](#).