IBM SmartCloud Orchestrator
Architected for Extensibility

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Solution benefits

- Accelerate deployment of cloud services using reusable **workload patterns** and **IT process automation**
  - Self-service portal allows for selection of cloud services from a predefined menu of offerings
  - Intuitive **graphical orchestrator** helps compose and customize workflows quickly and easily

- Deliver interoperable open cloud services with support for **open standards**
  - **Governance Services (OSLC support)** Eases coordination of complex tasks and workflows, leveraging existing skills, processes and tools
  - **Platform Services (TOSCA Support)** Simplifies deployment and lifecycle management of middleware and application patterns
  - **Infrastructure Services (OpenStack Support)** Provides support for highly flexible, scalable infrastructure on heterogeneous resources

- Extensibility
  - Pre-built images, patterns, process / configuration automation through the **Cloud Marketplace**

- Measure the cost of cloud services, keep track of cloud service health, perform capacity management of the cloud resources

### Capabilities

- Cloud Orchestration
- Provisioning
- Usage & Accounting / Metering
- Monitoring
- Capacity Management

Continuous delivery pipeline
Why do we need an Orchestrator?

1. Customers are looking for end to end automation of cloud service delivery to achieve greater returns
2. Provisioning play a key role, but is just one of many steps that must be automated
3. Each customer has unique requirements to integrate with existing data center processes and tools
What is SmartCloud Orchestration …

An open and scalable cloud platform

An easy to use orchestrator for cloud service automation

A marketplace for content sharing and re-use

A ready to use automation library
SmartCloud Orchestrator: Two editions

**SmartCloud Orchestrator 2.2**
- Provisioning platform
- Orchestrator (built on Business Process Manager 8.0)

**SmartCloud Orchestrator Enterprise 2.2**
- Provisioning platform
- Orchestrator (built on Business Process Manager 8.0)
- Tivoli Monitoring 6.3
- Tivoli Monitoring for Virtual Environment 7.2
  (VMWare and KVM agents. No entitlement to use agents for Cisco UCS, *Citrix XenApp, Citrix XenDesktop, Citrix XenServer*)
- SmartCloud Cost Management 2.1
  (base collectors, SCCM enterprise not included)
High level architecture
SmartCloud Orchestration and Provisioning

SCOrchestrator

Automation Engine
BPM Process Server

Content packages

Self Service
Offering Catalog

Modeling and Admin

Composite Patterns Management

Hypervisor Management
OpenStack Gateway

OpenStack

Cloud User

API

ICCT
Image Creation

Image Library

VMWare vCenter
VMControl Power

Cloud User

Amazon EC2

SmartCloud Enterprise *)

Service Desk
Licence Mgmt
Accounting
Cost Mgmt
Network FW/LB
Storage File-based

KVM
HyperV
ESX *)
XEN

Openstack Cinder driver for Block Storage

*) supported in following releases
Custom Orchestration Operations

- SCO allows definition of custom operations for various orchestration granularities
  - **Event triggered Actions**
    - ... used to extend the basic pattern engine capabilities
    - ... plug into existing programming flows at predefined plugpoints/events
    - ... with defined semantics and data model
    - e.g. Approval ('pre'), Open firewall port ('post'), ...
  
  - **User triggered Actions**
    - ... used to extend the basic manageability actions of service instances
    - ... provide addtl mgmt capabilities for all or specific patterns
    - e.g. Backup, Install SW, Open problem, ...

  - **Service Operations**
    - ... implementation of service catalog offerings
    - ... used for operations customized for the end user
    - e.g. deploy pattern, create filesystem, ...
    - ... used for administrative actions such as datacenter configuration
    - e.g. Register StorageHost, User onboarding, …
Trigger one or multiple custom processes on certain events
“My Inbox“

- Provides a consolidated view of "to-do's" such as approvals or process steps which require manual work
Content and the Marketplace ...
Establish cloud platform agility and value by rapidly delivering content (organic & partner ecosystem) using the AppStore model

- Enable customers to rapidly discover and implement cloud solutions
- Enable business partners and ISVs to create value by adding content to IBM cloud solutions
- Enable IBM services and development to rapidly deliver & iterate on capabilities in response to changing customer requirements and integration needs
- Enable collaboration within the ecosystem to accelerate customer value creation
Orchestration related content

Virtual System Patterns incl. vSys script pkg
Virtual Application Patterns
TOSCA Service Templates

ICCT software bundles

Images such as OpSys with agents

*) supported in following releases

Orchestrator
- IBM Tivoli Monitoring (ITM)
- SmartCloud Cost Management (SCCM)

Self Service
- Offering Catalog

ICCT Image Creation
- Image Library

Virtualization
- Automation Engine
- BPM Process Server

Content packages
- Service Desk
- Licence Mgmt
- Accounting
- Cost Mgmt
- Network FW/LB
- Storage File-based

Directional Services
- Composite Patterns Management
- Hypervisor Management
- OpenStack Gateway

OpenStack
- Amazon EC2
- VMWare vCenter
- KVM
- Openstack Cinder driver for Block Storage

Hybrid Extension

Marketplace

Orchestration related content
Pattern Management
Pattern capabilities

- Patterns are used to deploy more than one VM in one shot
  - The VMs can be deployed with no interconnection
  - The VMs can be deployed assuming after boot they will be connected (e.g. WAS cluster)

- Add-ons and script packages can be used to customize images
  - Script Packages
    - Are used to modify the behavior of parts in the pattern
    - Can be ordered
    - Can be used to install applications
    - Can run at VM creation, deletion time or when the user decides
  - Add-Ons
    - are used to configure NICs and users in the patterns
    - run BEFORE script packages
    - Cannot be ordered in a pattern
    - Run at VM creation time only

Note: pre-canned patterns can be downloaded from IBM Marketplace
- You can use the following built-in properties in script packages:
  - hostname, domain, ipaddr, netmask, gateway, pri_dns, sec_dns
  - The syntax is `${<partname>.<propertyname>}`
  - These properties are resolved at deployment time

Parameters for script Create DB2 Data Source to standalone DB2 Enterprise server

- **DATASOURCE_NAME**: SAMPLE
- **DATASOURCE_INDI_NAME**: SAMPLE
- **DATABASE_NAME**: SAMPLE
- **DATABASE_USERNAME**: db2inst1
- **DATABASE_PASSWORD**: 
- **DATABASE_HOST**: `${DB2_ESE.hostname}.${DB2_ESE.domain}`
- **DATABASE_PORT**: 50001
TOSCA Patterns

- **Topology and Orchestration Specification for Cloud Applications**
  - Standardizes a language for describing
    - The structure of Cloud services (aka “Topology”), including their components and relationships between components
    - The manageability behavior of Cloud services (aka “Orchestration”) In the form of plans based on the BPMN 2.0 standard

  - Declarative model reaching from application components to virtual and physical infrastructure
  - Uses and extends the reach of existing technologies and standards (e.g. OVF, CIM, SCA, …)
  - Brought forward as an OASIS standard by 13 leading IT companies
    - High resonance in IT industry – more than 100 participants from 40 companies
  - TOSCA Specification, Version 1.0 out since May 2013

Ref: https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=tosca
Orchestration - Technical Details …
Orchestration Registry
Configuration of Orchestration Actions

Configure an action that can be triggered either automatically or be made available to users for the selected patterns.

* Orchestration name: Provide a name for this orchestration

Description: Provide a description

* Action type: Event-triggered action

* Event selection: Select one

* Apply to: All virtual system patterns

Select the Business Process Manager process which fulfills this event-triggered action.

* Process: Select one

If the selected process requires user interaction, specify a user interface by selecting the related Business Process Manager human service.

* User interface: Select one

Sequence priority: 5

BPM process which implements the orchestration logic

BPM process which implements the end user interface
Configuration of Self Service Offerings

Create a new self-service offering.

* Offering name: Name for the service offering
* Description: Description for the service offering
* Offering icon: Select one
* Category: Select one

Select the Business Process Manager process which fulfills this service offering.

* Process: Select one

If the selected process requires user interaction, specify a user interface by selecting the related Business Process Manager human service.

* User interface: Select one

BPM process which implements the orchestration logic

BPM process which implements the end user interface

Settings to define the visualization of the offering in the service catalog

Deploy MediaWiki
Use this offering to deploy a MediaWiki instance
SmartCloud Orchestration Modeling User Experience

Palette of library assets enable easy workflow composition through drag and drop

Access to rich libraries (toolkits) of reusable automation assets that enable to speed automation creation

Rich set of action types, flow control, data handling primitives that simplify creation of complex automations

Graphical editor for composing and connecting workflows

Rich tooling functions to edit, version, debug, optimize workflows

Easy workflow action editing for managing: data mapping, error recovery options, implementation details, etc.
Orchestration Workflow Elements

- Typical control elements for workflows are Start/end nodes, Activities, decisions, ...

- Activities are implemented as …
  - **None** … No implementation; this is most useful when the diagram is initially being drawn and we are not yet ready to make a decision on how this step will best be implemented.
  - **User Task** … Implemented as a Human Service; this step will be performed by a human being.
  - **Decision Task** … Implemented as a decision service where rules will be executed to make a decision
  - **System Task** … Implemented as a technical or straight through step without human Interaction
    - Integration Service … eg Java, webservice, ..
    - General System Service
    - Ajax Service
  - **Script** … Implemented as a piece or snippet of in-line JavaScript code; most appropriate for one-time data manipulation such as initialization or simple copies of data from one variable to another.
  - **Sub-process** … Implemented as a sequence of additional activities (grouping structure)
  - **Linked Process** … Implemented as a call to another process defined separately

- Activities are connected through input/output data mappings
SCO Orchestration Programming Model

- Orchestration consists of
  - User interface process, incl panel definition(s)
  - Business process
  both are linked by
  - Orchestration specific data object
    *Input/OutputParameterObject*

- SCO defines specialization of generic BPM model
  - each process gets passed a predefined data object named
    *OperationContext* ..
    - Metadata such as id, status, user, description, …
    - Custom data container (key/value map)
    - vSys/vApp instance data (for event/user action)

- Easy-to-use extensibility mechanism for custom data
- Easy-to-use for mapping of data objects to process activity parameters
Summary ...
References

- Public Provisioning & Orchestration community
  → http://ibm.co/CPandO

- SCO 2.2 InfoCenter

- IBM Cloud Marketplace

- BPM 8.0.1 Infocenter

- Kolban’s IBM BPM
  - Book, tutorial videos, toolkit
  - http://www.neilkolban.com/IBM/
Summary

- Fully automates the deployment and lifecycle management of cloud services across resources, workloads and services
- Built on a foundation of open standards – TOSCA, OpenStack, OSLC
- Accelerated deployments with reusable workload patterns and Chef recipes
- Unified management of heterogeneous environments
- Supports deployment of hybrid & public clouds

Reduce time-to-market to deliver new business services

Improve administrator productivity