Self Service Control Loop
Acumos-DCAE Integration
Frankfurt Release

Architecture Subcommittee Review

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October 1, 2019
During May-September 2019, 2 projects have been developed in parallel:

- ONAP Frankfurt “Self Service Control Loop” feature – Propose enhancements to SDC to fix BP generator, onboard mS and policy models, and distribution CSAR to Policy and CLAMP for Control Loop Design. This feature requires community contributions to SDC.

- “Acumos-ONAP DCAE Integration” project – Developed DCAE MOD (Microservice Onboarding & Design) to adapt Acumos ML models into DCAE Compliant mS, and to onboard, design, configure, and deploy the mS into a DCAE runtime environment. (AT&T & Ericsson collaboration)

- 4 PTLs (SDC, DCAE, Policy, CLAMP) synced up, reorganized, and agreed to submit the following 2 features to Frankfurt release:
  - Jira REQ-9 “Self Serve Control Loop”: DCAE MOD onboarding & Design as the software components for the feature
  - Jira REQ-166 “Acumos-DCAE Integration”: DCAE MOD Acumos-DCAE Adaptor as the software component for the feature

The new DCAE MOD, replacing the mS onboarding & DCAE-DS in SDC, provides functionalities to:

- Support automated adaptation of ML model from Acumos to DCAE design & runtime environment.
- Provide simplified mS Onboarding, Service Assurance flow design, & mS configurations in DCAE.
- Auto-generate blueprint at the end of the design process, not onboarded before the design process.
- Support Policy onboarding & artifact distribution to Policy/CLAMP to support Self Service Control Loop.
- Integrate with ONAP User Experience portals (initially ONAP portal, later SDC portal).
# DCAE MOD Features

## New Capabilities

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Solution</th>
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<tbody>
<tr>
<td>1. Enable ingestion of ML models from Acumos to ONAP as advanced Service Assurance analytic applications. (Acumos-ONAP DCAE Integration requirement).</td>
<td>DCAE MOD: Provide an “Adaptor” with capabilities to translate an Acumos ML model into a DCAE compliant microservice.</td>
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<td>2. Onboard Policy model to DCAE (SSCL requirement).</td>
<td>DCAE MOD: Enhance mS Onboarding APIs to support policy models.</td>
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<tr>
<td>3. Distribution of Artifacts to Policy and CLAMP (SSCL requirement).</td>
<td>DCAE MOD: Add additional artifacts and interfaces in DCAE Designer for artifact distribution to Policy &amp; CLAMP.</td>
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## Issues Addressed

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
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<tr>
<td>1. Due to resource constraints, there are mismatched capabilities between SDC/DCAE-DS and DCAE mS deployment.</td>
<td>DCAE MOD:</td>
</tr>
<tr>
<td>2. Due to #1, mS developers upload handcrafted blueprint, and stay involved throughout the deployment process. This also ties mS development to specifically Cloudify implementation.</td>
<td>• Move DCAE mS onboarding &amp; design system software development from SDC project to DCAE Project.</td>
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<tr>
<td>3. No Service Assurance flow design in SDC/DCAE-DS, therefore no reusable flow designs for the Service Designer.</td>
<td>• DCAE-MOD is developed by the DCAE team to ensure consistency across all DCAE implementation, with the long term objective to integrate with SDC as part of the Design Platform.</td>
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<tr>
<td>4. Extensive reliance on developers’ involvement in providing [Inputs.json] as runtime configurations for mS deployment.</td>
<td>• Provide a simplified mS onboarding &amp; design process to support developers, service designers, and operations.</td>
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<tr>
<td>5. No E2E tracking of microservice lifecycle.</td>
<td>• Support Service Assurance FLOW design and microservice design time &amp; runtime configurations.</td>
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<tr>
<td></td>
<td>• Catalog &amp; data for microservice lifecycle tracking.</td>
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PMO - DCAE Onboard/Design Issues

DCAE MS Configuration & Deployment (DCAE)

Input File Generation

Create mS input file

Operations

DCAE Dashboard

mS Configuration for runtime

DCAE Dashboard

Deployment

DCAE Inventory

Dockercentral (Nexus)

SDC

VNF Onboarding & Design Service

Standard VNF Package

Design Studio

SDC Design Catalog

DCAE-DS (Designer)

DCAE Blueprint Distribution

Distribution

DCAE Blueprint Generator (Docker only)

DCAE Service Assurance Design

Service Designer

Upload mS Tosca Model files to the design catalog

TOSCA Model Files

TOSCA Model Generator

SDC Onboarding GUI

Spec.json

mS metadata definition

mS image

Onboarding Toolbox (TOSCA_Lab)

Blueprint Generator

Most mSs are Onboarded via this backend flow today

Microservice Developer

Additional Developer’s workload for runtime deployment

DCAE mS Onboarding

Input File Generation

Create mS input file

SDC Onboarding GUI

TOSCA Model Generator

Blueprint Generator

DCAE Blueprint Distribution

Blueprint Generator (Docker only)

VNF Onboarding & Design Service

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DCAE-DS (Designer)

DCAE Blueprint Distribution

Distribution

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DCAE Service Assurance Design

Service Designer

Upload mS Tosca Model files to the design catalog

TOSCA Model Files

TOSCA Model Generator

SDC Onboarding GUI

Spec.json

mS metadata definition

mS image

Onboarding Toolbox (TOSCA_Lab)

Blueprint Generator

Most mSs are Onboarded via this backend flow today

Microservice Developer

Additional Developer’s workload for runtime deployment
FMO - A Simplified Onboarding/Design with DCAE MOD

Acumos Marketplace Catalog

MS Package
- mS Metadata (Spec.json & DataFormat.json)
- mS Policy Model
- MS Image (Docker or k8)

Onboarding CLIs/GUIs/APIs

Developer onboards with CLI (today) or GUI (future)
DCAE mS Adaptor uses APIs

DCAE mS Deployment
- Policy
- CLAMP

DCAE mS Adaptor for Acumos-ONAP Integration

DCAE MOD Scope

SDC

SDC GUI
- Design Studio
- SDC Design Catalog

DCAE Designer
- GUI
- mS/DMaaS Flow Design
- mS Design Time Configurations
- mS Runtime Configurations
- Distribute for Blueprint Generation

DCAE Design Catalog

Onboard to DCAE Design DB

MS Package

Dockercentral (Nexus)

Service Designer

SDC Catalog

DCAE
- Inventory
- Service Assurance
- Design
- Onboarding & Design Service

Microservice Developer

FMO - A Simplified Onboarding/Design with DCAE MOD

Onboarding with DCAE mS Adaptor
- MS Package
- MS Policy Model
- MS Image

BP Generator

Distribute for Blueprint Generation

DCAE MOD Scope
Change the mS onboarding process with just the metadata (no BP)
Onboard mS policy model the same way as mS, via the new DCAE Onboarding process
Replace DCAE-DS with a new DCAE Designer
DCAE generates BP at the end of the design process
Simplify the process from design to runtime
DCAE uses Policy API to send policy models
DCAE Designer sends flow artifact to CLAMP
CLAMP retrieves BP from DCAE
Establish GUI and Catalog integration APIs between DCAE-MOD and SDC (future)
DCAE MOD Contribution Description

Impacted Project(s): DCAE

- **Frankfurt** – Self Serve Control Loops feature, and **Acumos-ONAP DCAE Integration** feature

DCAE MOD Descriptions:

- **Acumos-DCAE Adaptor**: Enable ML model federation from Acumos to ONAP, translate and onboard ingested ML models to DCAE compliant microservices in ONAP design time and runtime.
- **Microservice/Policy Onboarding APIs**: provide APIs for automated microservice & its associated policy model onboarding.
- **DCAE Designer**
  - **Flow Design**: GUI and Catalog support for service assurance flow design with microservices and DMaaP topics.
  - **Microservice Design Time & Runtime Environmental Configurations**
  - **Version Control, Reporting, & Tracking**
  - **Submit for BP generation** (in conjunction with Input Parameter Generator (IPG))
  - **Distribute for BP generation to DCAE Inventory** (can be retrieve by CLAMP, & DCAE Dashboard for deployment)
  - **Distribute Policy model to Policy Platform** (via Policy APIs)
  - **Distribute SA Flow artifact to CLAMP** (format TBD)
<table>
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<tr>
<th>Work Item</th>
<th>SDC</th>
<th>DCAE (with DCAE MOD)</th>
<th>CLAMP</th>
<th>Policy</th>
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<tr>
<td>Policy Model Onboarding</td>
<td></td>
<td>Use the new DCAE mS Onboarding to concurrently onboard the associated mS Policy model</td>
<td>No Impact</td>
<td>No Impact</td>
</tr>
<tr>
<td>mS Onboarding</td>
<td>Retire existing SDC mS Onboarding</td>
<td>Use the new DCAE mS Onboarding CLI/GUIAPI</td>
<td>No Impact</td>
<td>No Impact</td>
</tr>
<tr>
<td>DCAE Flow Design &amp; mS Configuration</td>
<td>Retire existing DCAE-DS</td>
<td>Use the new DCAE Designer</td>
<td>No Impact</td>
<td>No Impact</td>
</tr>
<tr>
<td>mS BP Generation</td>
<td>Retire BPG used by SDC before the design process</td>
<td>Use automated DCAE BPG at the end of the design process</td>
<td>No Impact</td>
<td>No Impact</td>
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<tr>
<td>Distribute Policy model association with a mS</td>
<td></td>
<td>Use DCAE Designer to simplify the artifacts distribution to CLAMP/Policy</td>
<td>Query Policy for μS policy-model (this is a minor addition given that we needed to do it for Operational and guard Policy anyway)</td>
<td>No Impact</td>
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<tr>
<td>SDC packages mS BP into CSAR</td>
<td></td>
<td>No Impact</td>
<td>No Impact</td>
<td>No Impact</td>
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<tr>
<td>SDC &amp; DCAE MOD Catalog Integration</td>
<td></td>
<td>Provide catalog APIs to send NFP and Collector models to DCAE Designer/Catalog (Later Release)</td>
<td>No Impact</td>
<td>No Impact</td>
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<tr>
<td>DCAE MOD User Experience integration</td>
<td></td>
<td>With ONAP portal (Frankfurt) With SDC Portal (later release)</td>
<td>No Impact</td>
<td>No Impact</td>
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### Self Service Control Loop Impact Analysis (Cont’d)

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<tr>
<th>Work Item</th>
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<td>CL workflow Distribution</td>
<td></td>
<td>DCAE Designer send flow design artifacts to CLAMP</td>
<td>• Support new interface from DCAE to receive Control Loop flow description (format of the flow still needs to be agreed upon)</td>
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<td></td>
<td></td>
<td></td>
<td>• Support interface from DCAE to query DCAE inventory for BP</td>
<td></td>
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<td>CLAMP Control Loop workflow management &amp; execution</td>
<td></td>
<td></td>
<td>• Ability to support the old clamp workflow (policy model, blueprint inside csar) together with the new clamp workflow (receive flow artifact from DCAE, query DCAE inventory, trigger instantiation of individual µS BP, ...). This is for backward compatibility reason.</td>
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<td></td>
<td>• Orchestration of the Control Loop flow to individually trigger instantiation of µS BP which are part of the flow</td>
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ONAP Design Time Architecture Evolution

**User Experience Layer**

**SDC Design Time User Experience Workflow & GUI**

- **SDC Provided User Experience APIs for application plugins**

**Application layer**

- **Service Assurance Design Tools**
  - DCAE-MOD Evolution to integrate with Policy Design and CLAMP Design

- **xNF Onboarding & Service Design Tools (SDC)**

- **Service Configuration Design Tools**
  - Workflow Design (e.g., Change Management)
  - Controller Design Studio (CDS)

**Data Layer**

- **SDC and Application Design Catalog Integration via APIs**
  - DCAE Design Catalog
Backup
DCAE MOD Technical Solutions

Apache Nifi component
AT&T developed

Roles to support - capacity planners and operations, designers, developers, managers, system engineers

Architecture
2019-09-13
Main technical concept is flow based programming. DCAE MOD fits that paradigm.

Nifi and flowbased org are notable players in FBP. We ended up combining things from both groups: Nifi (ui, web-api, registry) and FBP protocol from flowbased group.

The FBP protocol is used to create a nice loose coupling between design and runtime which means the runtime can be extended to support runtimes that have different orchestration methods/technology like helm charts.

Support of multiple environments and version control to support multiple releases.

Focus on ECOMP concerns w.r.t environment variables in configuration, reports and tracking of the microservices.