



MUlti-Cloud Secure Applications

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MUSA Framework

MUSA Risk Analysis & Decision Support Tool

Identify Risks & required Security Controls.

Select CSPs

CSP categorization



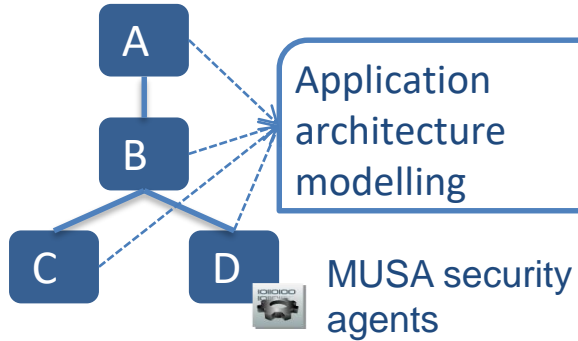
MUSA SLA Generator



QoS & QoSec

- Component SLA templates
- Composite app SLA

MUSA Modeller



MUSA Distributed Deployer



MUSA Security Assurance Platform (SaaS)

Monitoring, enforcement and notification services



DevOps team

Agile DevOps

MUSA SecDevOps DASHBOARD

MUSA Dashboard - SecDevOps

The screenshot displays the MUSA Dashboard interface for SecDevOps. The dashboard is titled "Multi-cloud Secure Applications" and includes a top navigation bar with a "SWITCH TO APPLICATION ID: 159" dropdown and a "NEW APPLICATION" button. The main area is divided into several panels:

- MODEL:** Contains a "+ ADD COMPONENT" button and two component boxes. The first box is labeled "Component1" and has a red "X" icon. The second box is labeled "Component2" and has a blue checkmark icon and a red "X" icon.
- RISK:** Contains a box labeled "TSMEngine".
- SERVICE SELECTION:** An empty panel.
- PLAN DEPLOYMENT:** An empty panel.
- SLA:** Contains four service boxes, each with a "DETAILS" button: "ConsumptionEstimator", "JourneyDatabase", "JourneyPlanner", and "IDMAM".
- EXECUTE:** An empty panel.

MUSA Modeller



MUSA IDE Web Editor

```
411 configuration TSMEgineAccessControlAgentConfiguration {
412     CHEF configuration manager C1 { //Configuration Management tool
413         cookbook: 'TSMEgineAccessControlAgentConfigurationCookbook1'
414         recipe: 'RecipeZ'
415     }
416 }
417
418
419 internal component TSMEgineVulnScannerAgent {
420     type:
421     provi MUSA.MUSADEP.ENFAG1      MUSAAgentComponent {port: 000 }
422     requi MUSA.MUSADEP.ENFAG2      MUSAAgentComponent {port: 000 mandatory}
423     requi MUSA.MUSADEP.ENFAG3      MUSAAgentComponent //The same host as the mc app internal component ass
424     requi MUSA.MUSADEP.ENFAG4      MUSAAgentComponent
425
426
427 configuration TSMEgineAccessControlAgentConfiguration{
428     CHEF configuration manager C1 { //Configuration Management tool
429         cookbook: 'TSMEgineAccessControlAgentConfigurationCookbook1'
430         recipe: 'RecipeZ'
431     }
432 }
433 }
```

MUSA Risk Analysis & Cloud Service Selection

Components Description

Database [DETAILS](#)

SQL Database

STRIDE based Risk Assessment

Journey Planner [DETAILS](#)

Threats: 1 Status: Medium Risk Severity

IDM [DETAILS](#)

Security Controls

SchedEngine [DETAILS](#)

Threats: 4 Status: Low Risk Severity Mostly mitigated

Validation

Services Selection

Double click to select deployment

<p>Deployment Score: NaN</p> <p>SHOW DETAILS</p>		<p>Component Name: ConsumptionEstimator</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: IDMMAM</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: JourneyDatabase</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>
<p>Deployment Score: NaN</p> <p>SHOW DETAILS</p>		<p>Component Name: ConsumptionEstimator</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: IDMMAM</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: JourneyDatabase</p> <p>Service Provider: Aimes</p> <p>Location: United Kingdom </p>
<p>Deployment Score: NaN</p> <p>SHOW DETAILS</p>		<p>Component Name: ConsumptionEstimator</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: IDMMAM</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: JourneyDatabase</p> <p>Service Provider: GreenCloud</p> <p>Location: Iceland </p>
<p>Deployment Score: NaN</p> <p>SHOW DETAILS</p>		<p>Component Name: ConsumptionEstimator</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: IDMMAM</p> <p>Service Provider: CloudSigma</p> <p>Location: Switzerland </p>		<p>Component Name: JourneyDatabase</p> <p>Service Provider: Intracom-Telecom</p> <p>Location: Greece </p>

MUSA SLA Generator

The screenshot displays the MUSA SLA Generator interface. At the top, there is a navigation bar with tabs for 'App View', 'SLA Generation', 'SLA Assessment', 'SLA View' (which is active), and 'SLA Compose'. The 'SLA View' tab is selected, and the main content area is titled 'SLA Quick Viewer'. Below the title, there are three buttons: 'Show Generated SLA', 'Show Assessed SLA', and 'Select SLA From Repository'. A dropdown menu labeled 'Choose SLA Identifier:' is open, showing the value '58C80E7DE4B087630C0C3D4E'. Below this, there are sections for 'Context' (1), 'Service Description Term' (4), and 'Service Level Objectives' (4). The 'Service Description Term' section contains two tables. The first table lists 'Control Framework' and 'Name', with one entry: 'NIST_800_53_r4' and 'NIST Control framework 800-53 rev. 4'. The second table lists 'Control Family', 'ID', and 'Name', with four entries: 'AC' (AC-6) 'SEPARATION OF DUTIES', 'AC' (AC-1) 'ACCESS CONTROL POLICY AND PROCEDURES', 'IA' (IA-1) 'IDENTIFICATION AND AUTHENTICATION POLICY AND PROCEDURES', and 'SC' (SC-23) 'SESSION AUTHENTICITY'. The 'Service Level Objectives' section contains a table with four columns: 'ID', 'Metric Ref', 'Operator', and 'Operand', with four rows of data.

SLA Quick Viewer

Show Generated SLA Show Assessed SLA Select SLA From Repository

Choose SLA Identifier:
58C80E7DE4B087630C0C3D4E

Context 1

Service Description Term 4

Control Framework	Name
NIST_800_53_r4	NIST Control framework 800-53 rev. 4

Control Family	ID	Name
AC	AC-6	SEPARATION OF DUTIES
AC	AC-1	ACCESS CONTROL POLICY AND PROCEDURES
IA	IA-1	IDENTIFICATION AND AUTHENTICATION POLICY AND PROCEDURES
SC	SC-23	SESSION AUTHENTICITY

Service Level Objectives 4

ID	Metric Ref	Operator	Operand
0	Identity Assurance	geq	2
1	Level of confidentiality	geq	2
2	Identity Assurance	geq	2
3	Forward Secrecy Activation	eq	yes

MUSA Deployer

Implementation plan

```
1 {
2   "sla_id" : "DEP-1484299185195",
3   "creation_time" : 1484299185195,
4   "csps" : [ {
5     "iaas" : {
6       "provider" : "OpenStack",
7       "zone" : "RegionOne",
8       "user" : "ubuntu",
9       "network" : "38a20d88-71a0-4880-9436-43b025a8b18d"
10    },
11   "pools" : [ {
12     "pool_seq_num" : 0,
13     "vms" : [ {
14       "vm_seq_num" : 0,
15       "appliance" : "RegionOne/0afc5035-e48b-4d0a-85f8-d6486be818dd",
16       "hardware" : "RegionOne/b81c9f30-2f00-48c2-95c4-cd9c843a77de",
17       "components" : [ ]
18     } ]
19   } ]
20 } ],
21 "slos" : [ ],
22 "measurements" : [ ],
23 "annotations" : [ ]
24 }
```

SAVE PLAN

MUSA Security Assurance Platform (MUSA SecAP) - SaaS

Dashboard - Musa Assur x

Wissam

assurance-platform.musa-project.eu/user/app/376e0c2f-040a-11e7-9107-fa163eef35a8

Help My Apps Account

Link Network Application DPI Security Evasion SLA

Probe All

Select Metrics

Metrics	Alerts	Violations	Priority	Enable	Supported
TSM engine (37.48.247.117)					
Availability	<= 0.98	<= 0.95	HIGH	ON	✓
Vulnerability Measure		< 0	MEDIUM	OFF	✓
Risk Assessment Vulnerability Measure		< 0	MEDIUM	OFF	✗
M13-Scanning Frequency - Basic Scan		I= 24	MEDIUM	ON	✓
M22-Scanning Frequency - Extended Scan		I= 24	MEDIUM	ON	✓
M23-Up Report Frequency		I= 24	MEDIUM	OFF	✗
Resilience to attacks		I= "yes"	MEDIUM	OFF	✗
Vulnerability and malware		I= "yes"	MEDIUM	OFF	✗
M2-Level of Diversity		< 1	MEDIUM	OFF	✗
M14-List Update Frequency		I= 24	MEDIUM	OFF	✗
Personal data disclosure		I= "yes"	MEDIUM	OFF	✗

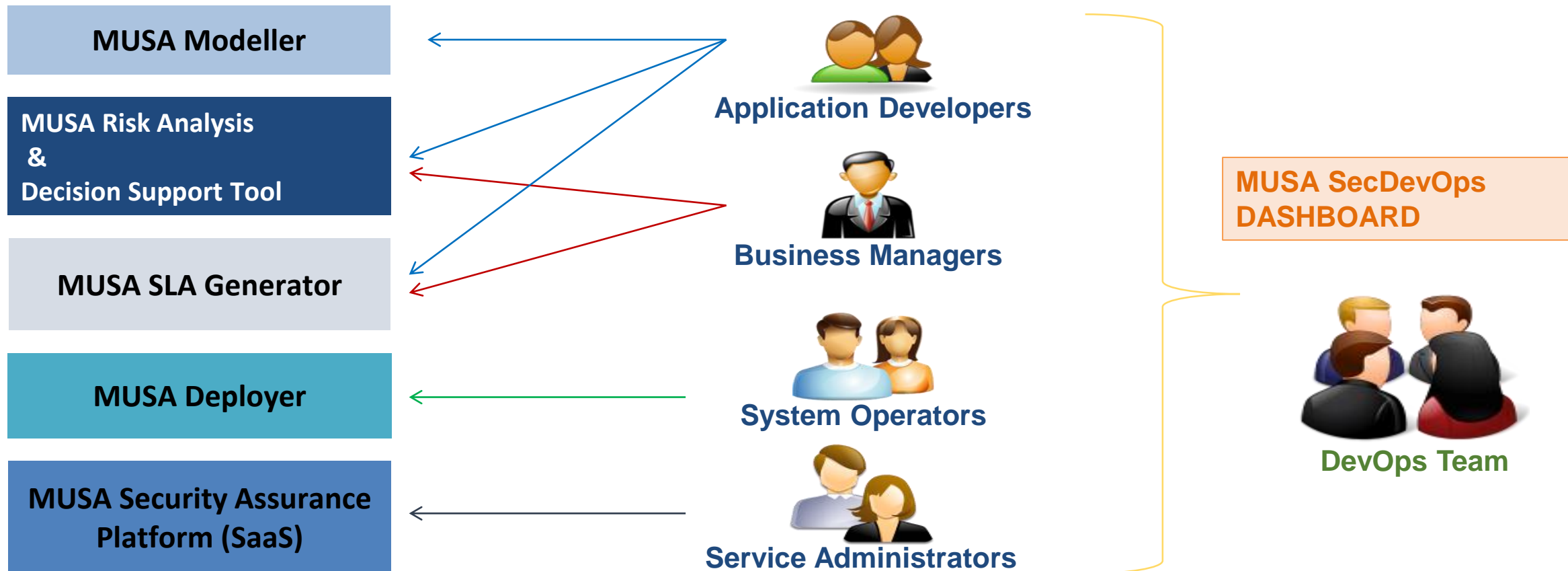
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Tools in the MUSA Framework

MUSA tools are **all open source**.

First prototypes available to test! www.musa-project.eu



MUSA success stories

Flight Scheduling

- Scheduling prototype application by Lufthansa Systems
- Data localisation, data retention and deletion, data integrity, confidentiality, access control, etc.



Smart Mobility

- Energy efficient and sustainable multi-modal transit of Tampere citizens when commuting from home to work and vice versa
- Based on services exposed in *Intelligent Transport Systems and Services (ITS) platform* (<http://wiki.itsfactory.fi>)
- Confidentiality and privacy of citizens' personal data and location



MUlti-cloud Secure Applications

Thank you!

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www.musa-project.eu



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MUSA project (Group)



MUSA Project