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Towards Cloud Application Description Templates Supporting Quality of Service

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- Introduction to COLA
- COLA Architecture
- COLA and TOSCA
- QoS Policies Overview and Structure

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Problems in the migration to Cloud

- Intrinsic complexity required to describe:
  - the correlated services,
  - the QoS that describe its execution,
  - the procedures to deploy, undeploy and migrate applications in different IaaS platforms.

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The COLA (Cloud Orchestration at the Level of Application) Project

- COLA aims at addressing the previously mentioned difficulties to foster the adoption of cloud computing services.

- The COLA project will provide a reference implementation of a generic and pluggable framework that supports the optimal and secure deployment and run-time orchestration of cloud applications.

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The COLA (Cloud Orchestration at the Level of Application) Project

- Applications can then be embedded into workflows or science gateway frameworks to support complex application scenarios from user-friendly interfaces.

- A specific aspect of the cloud orchestration framework developed by COLA is the ability to describe complex application architectures incorporating several services.

- The framework will also support the definition of various Quality of Service (QoS) parameters related to performance, economic viability and security.

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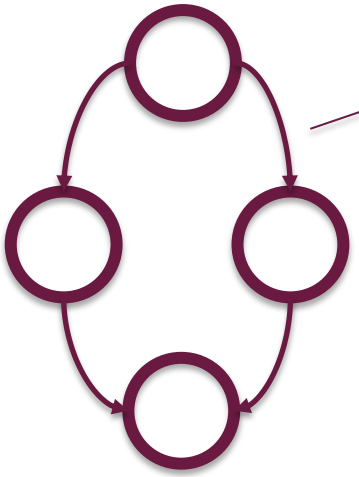
Cola Concept



Describe the overall topology.

What is the Application ?

Describe the Execution Modalities.

How do I execute the Application ?

COLA
Cloud Orchestration at the Level of Application

Execute the Application

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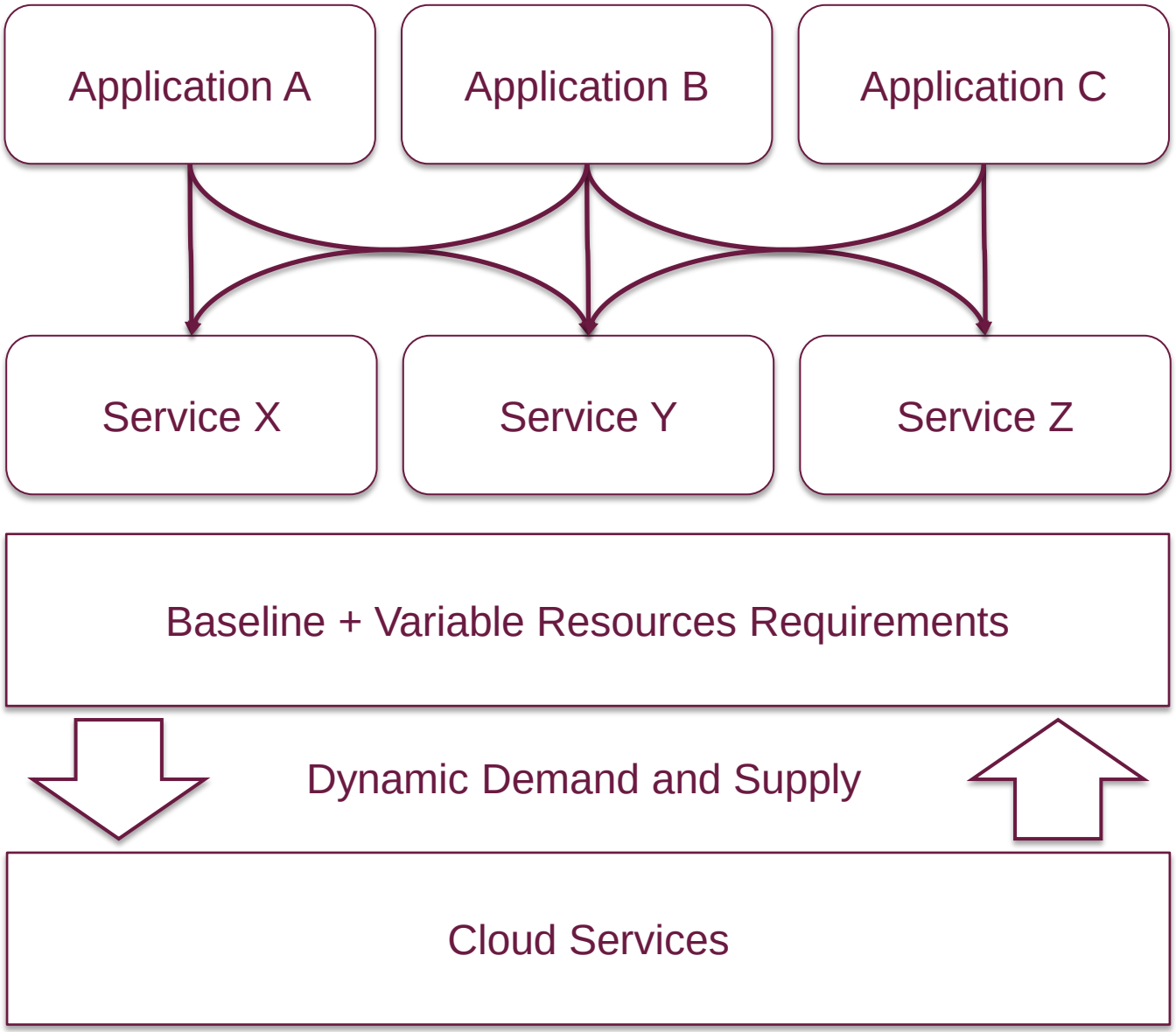
COLA Concepts



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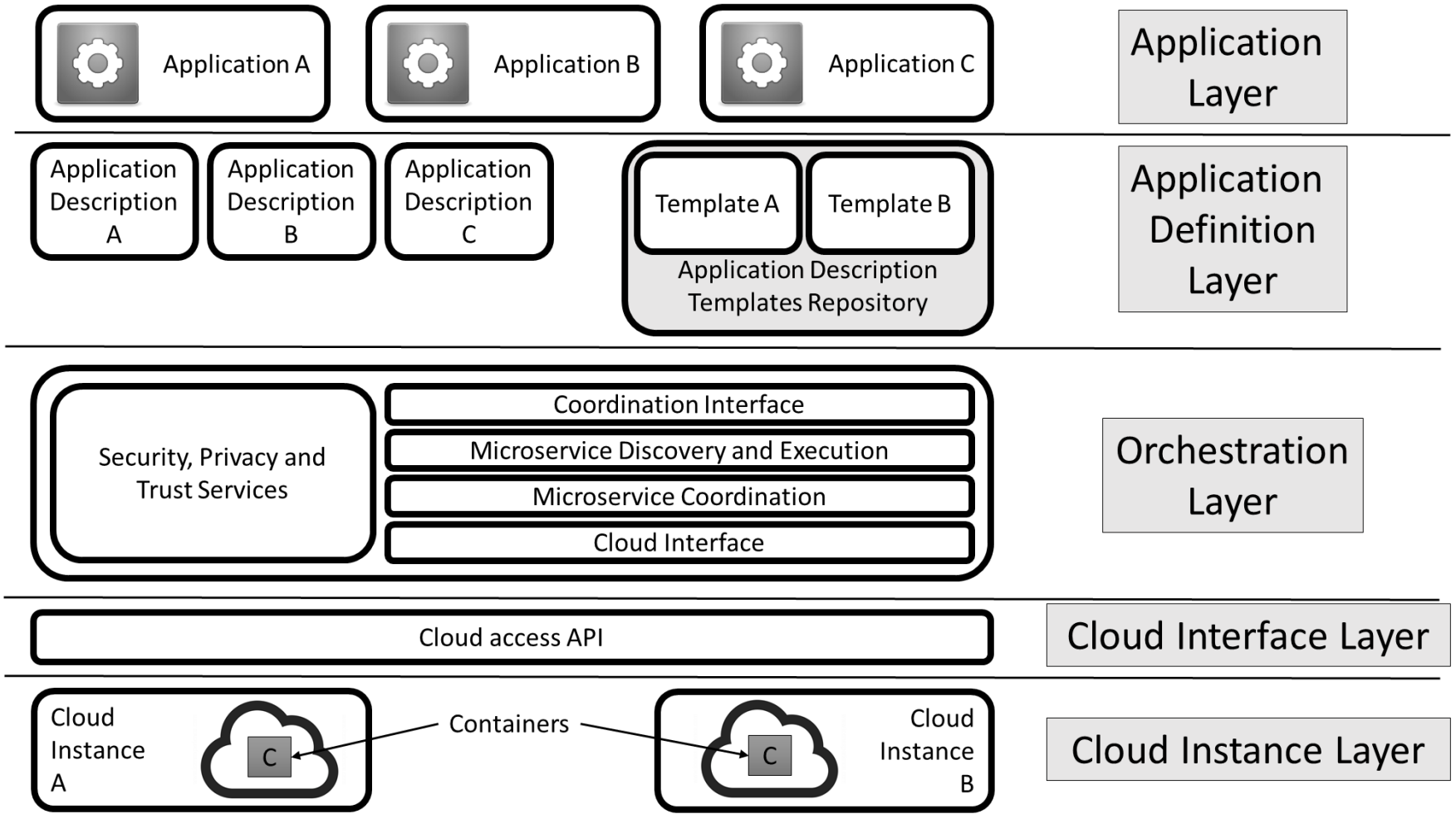
COLA Architecture



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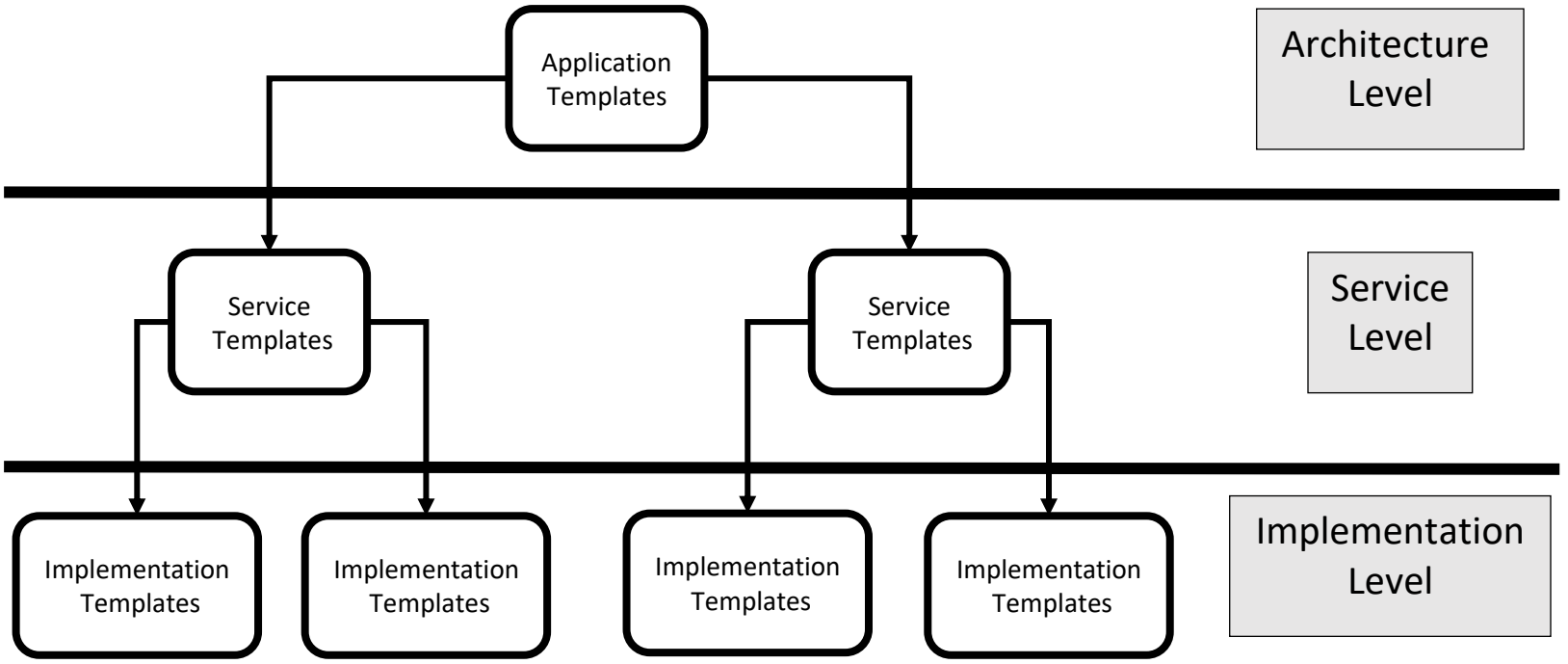
The Application Description Architecture



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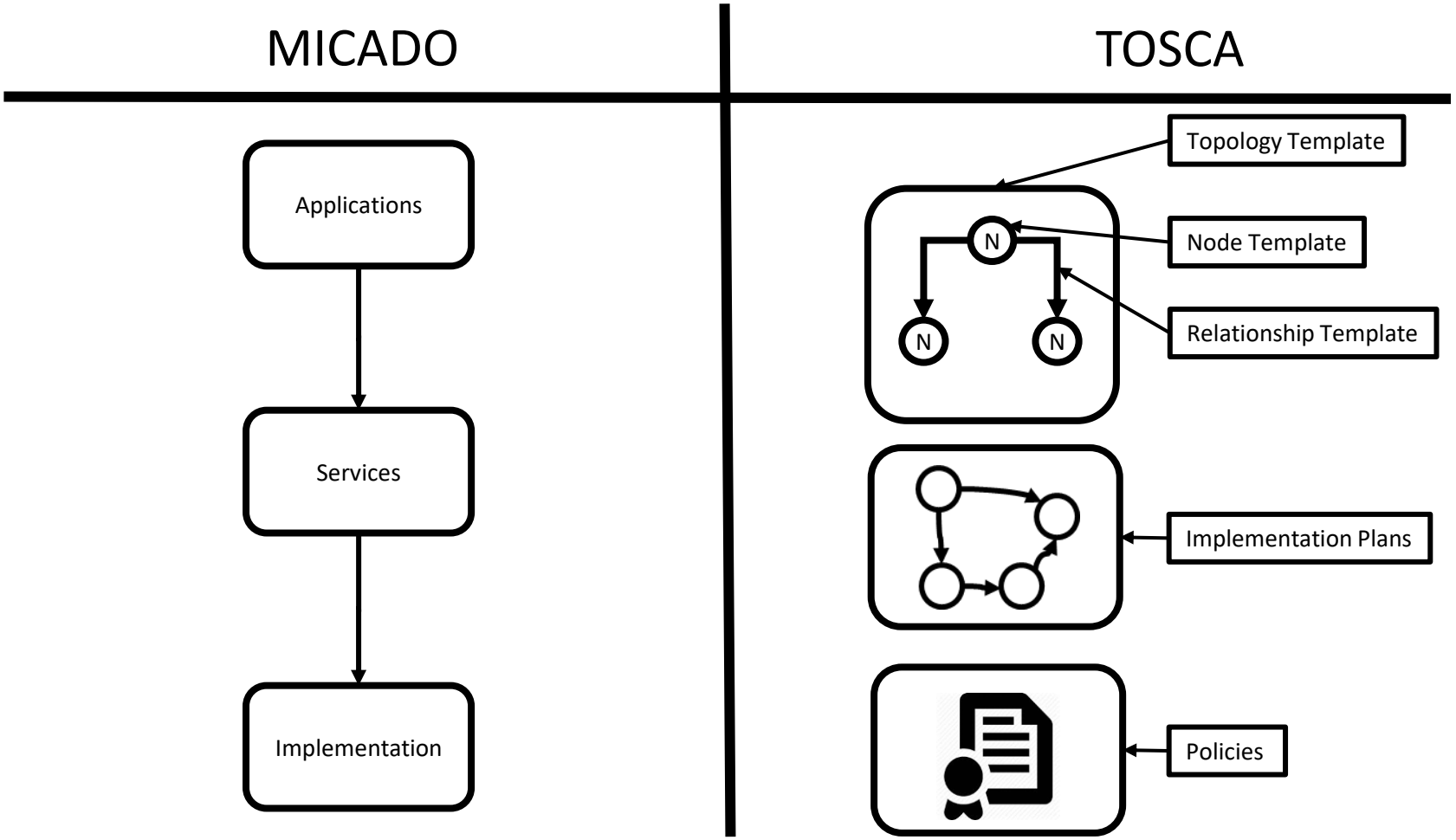
COLA, MICADO and TOSCA



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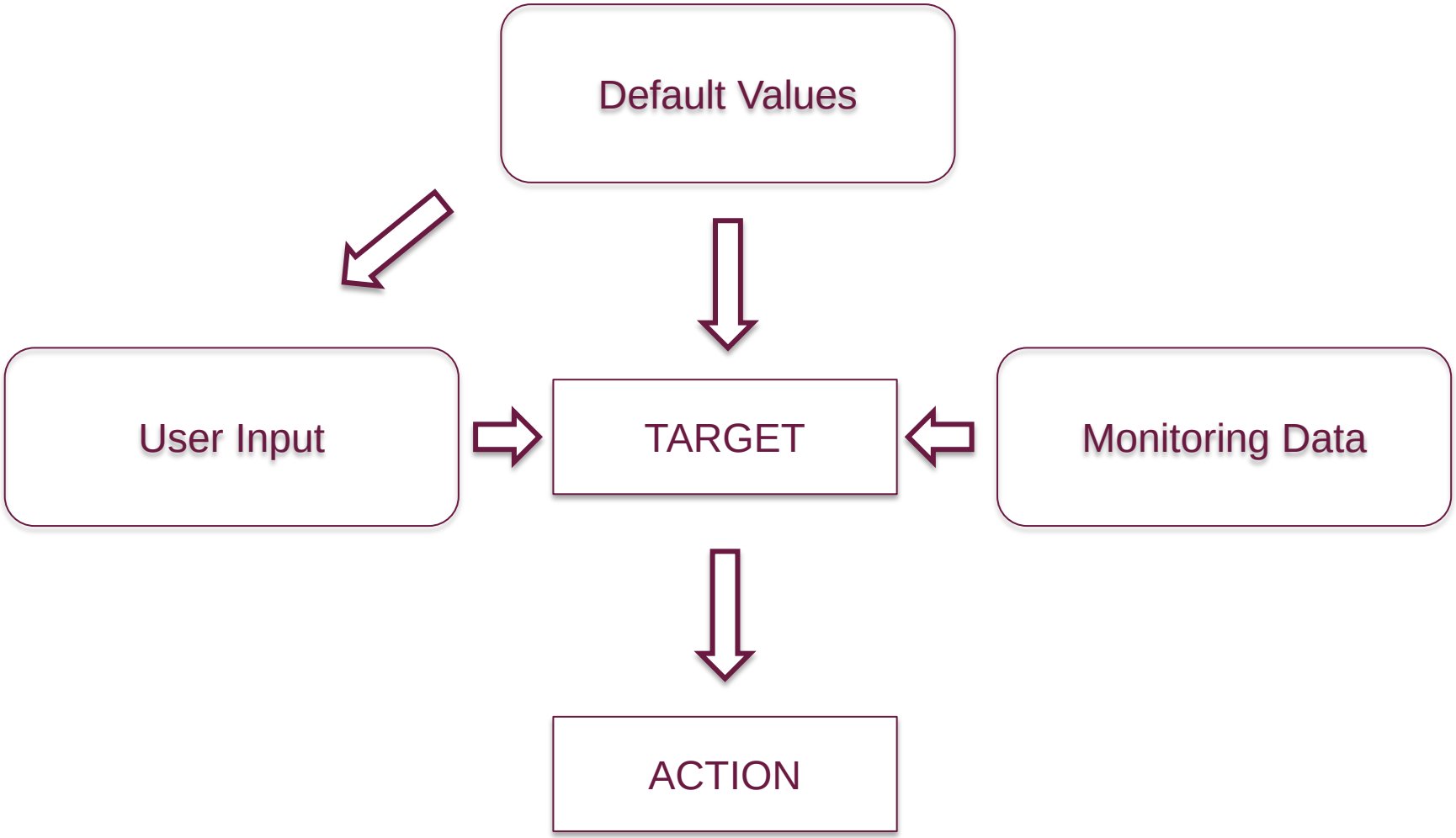
Application Description and Policies



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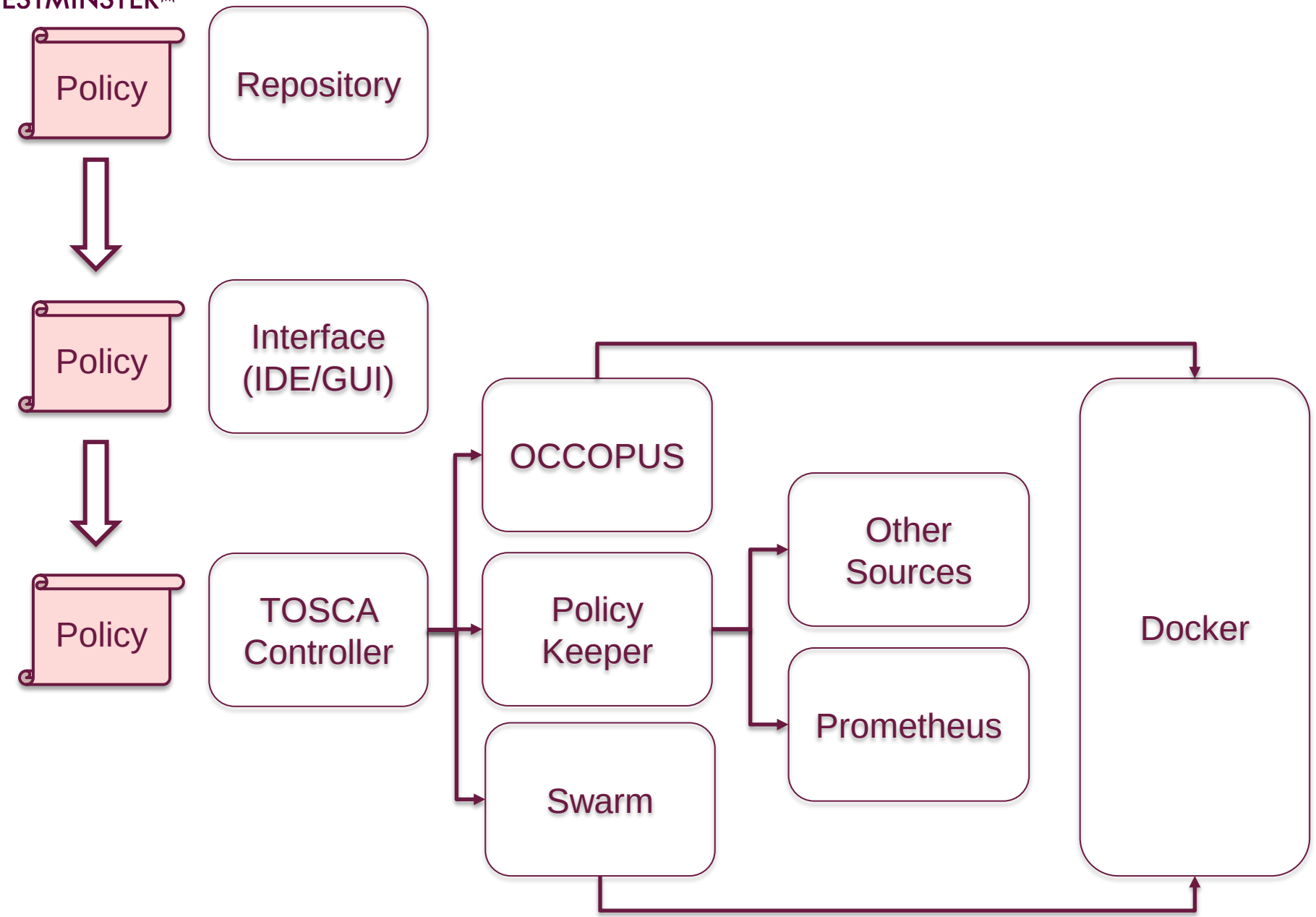
Application Description and Policies



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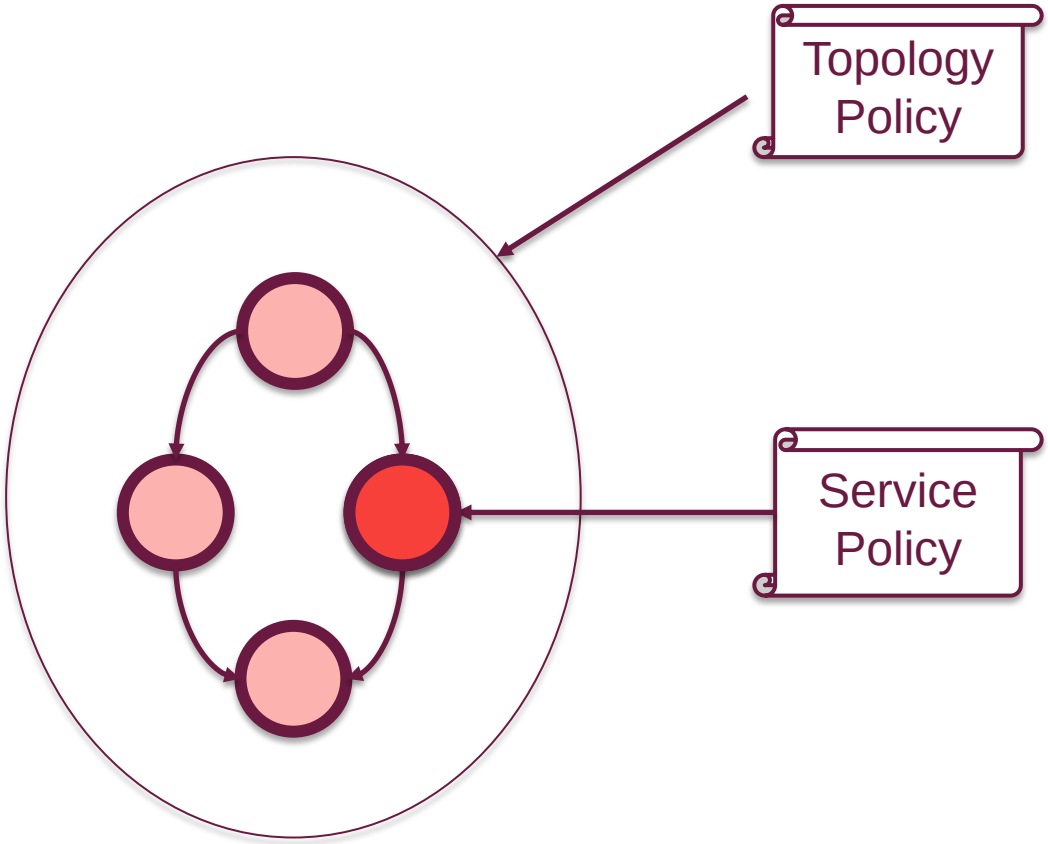
Application Description and Policies



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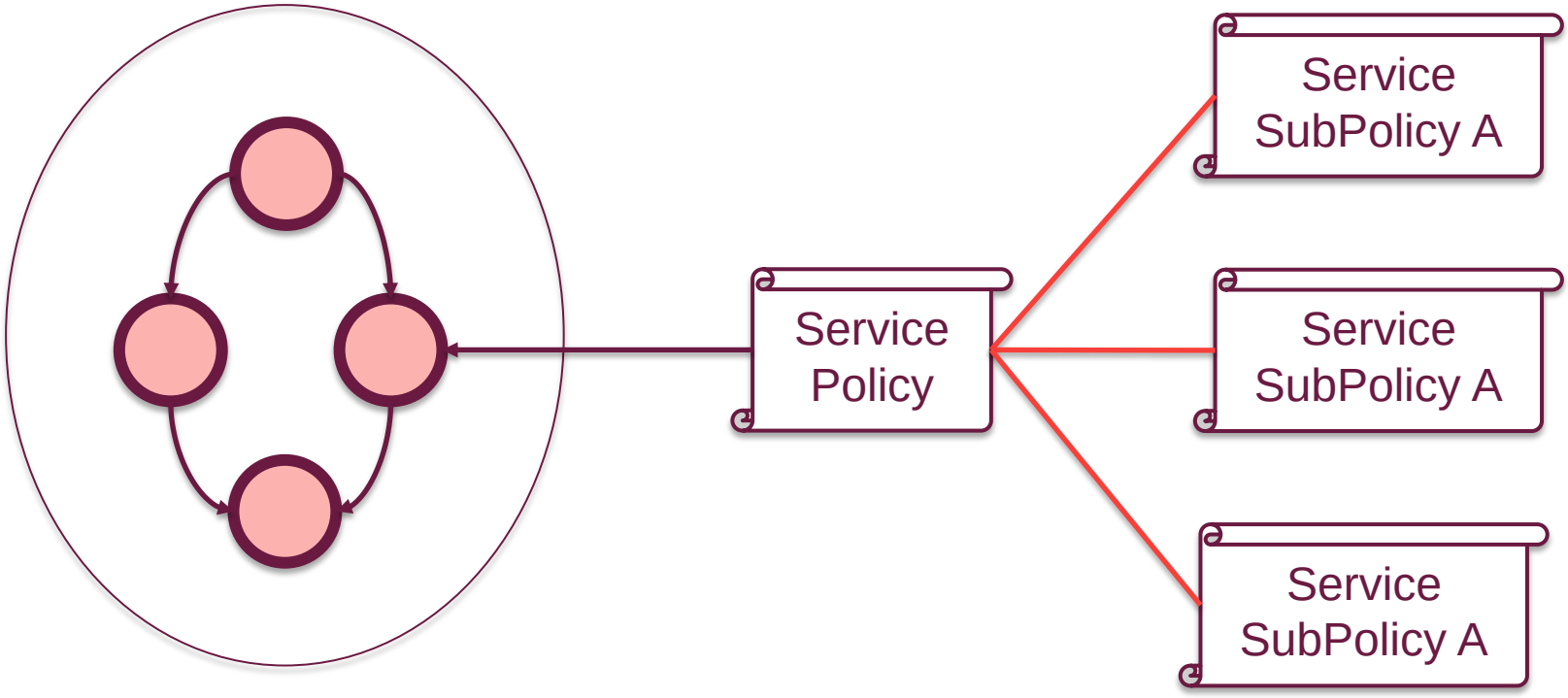
Application Description and Policies



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Policies Parameters

- **Stage**: Deployment, Runtime, Undeployment
- **Topological Layer**: Global (all nodes), Local (single node)
- **Technological Layer** (Target): Service, Operative System, Virtual Machine, etc…

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Design Constraints/Guidelines

– **Declarative Model**. The policies description follows the Declarative Model. E.g. they describe a policy but they do not imperatively describe how to implement the policy, which is left to the proper components of the COLA architecture

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Design Constraints/Guidelines

- **Pick and Choose Policies**. Users can select policies from a basket of existing policies but cannot create new policies

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Design Constraints

– **Parameter-Based Policies**. Users can define parameters of the selected policies but cannot change the structure of the selected policies.

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Design Constraints

- **No Consistency is ensured**. Policies may be contradictive.
- At this stage of the policies description, only a priority level will be offered to the user to define which policy has the highest priority but this priority may not always be respected.

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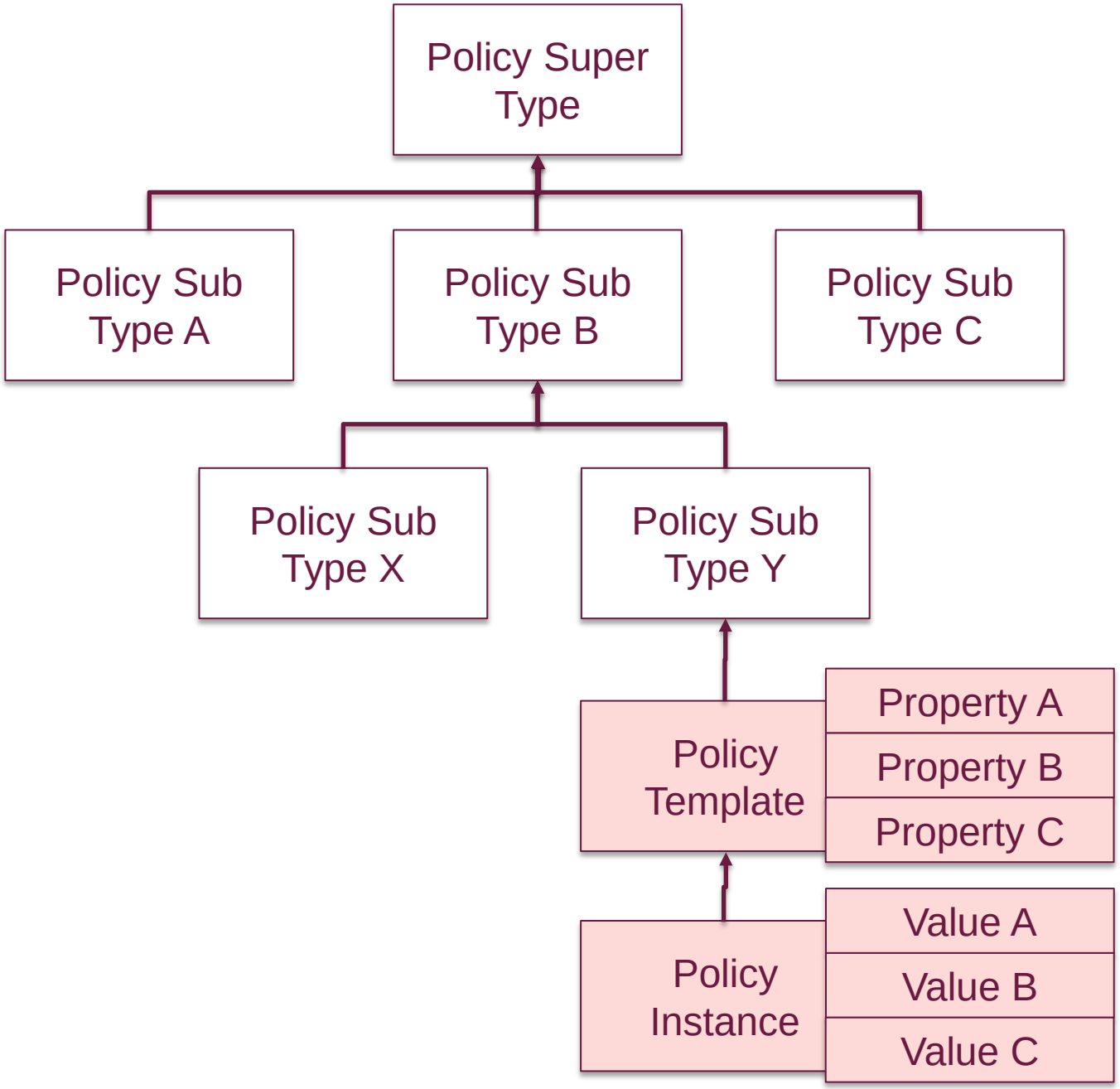
Generic Policy Structure



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Generic Policy Structure

- **Name:** A String that represents the name of the Policy
- **Type:** A String that defines the type of the policy, as an example: Authentication, Location, etc…
- **Description:** A textual description of the policy
- **Stage:** Define at which stage the policy applies. As an example, a policy may apply at deployment stage, or execution stage.
- **Priority:** This is an arbitrary integer of 0 to 100 used to define the priority with which the policy will be implemented.
- **Targets:** Targets define the technological element to which the policy has to be applied.
- **Parameters:** Description: Each policy is described by a list of parameters

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Generic Policy Structure - Parameters

***Accepted values* + Triggers**:

Name	Description	Default Value	User Input	Constraints	Required	Trigger

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Conclusions and Questions

- First Investigation of the Extension of TOSCA to describe policies will be completed in the summer

- Micado Architecture is in its third iteration and already supports simple policies although not expressed in TOSCA.

- Once the TOSCA extension will be tested, further research could investigate:
  - Solution of policies conflicts beyond simple priorites
  - Extending the trigger data sources namespaces beyond the available services