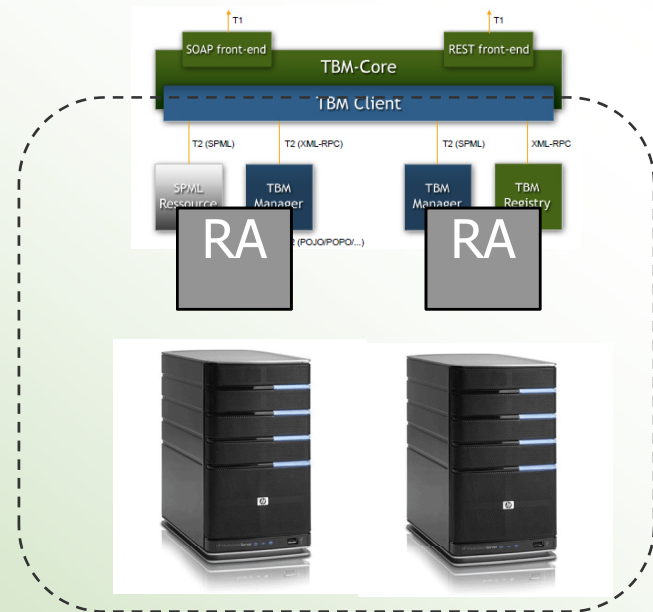
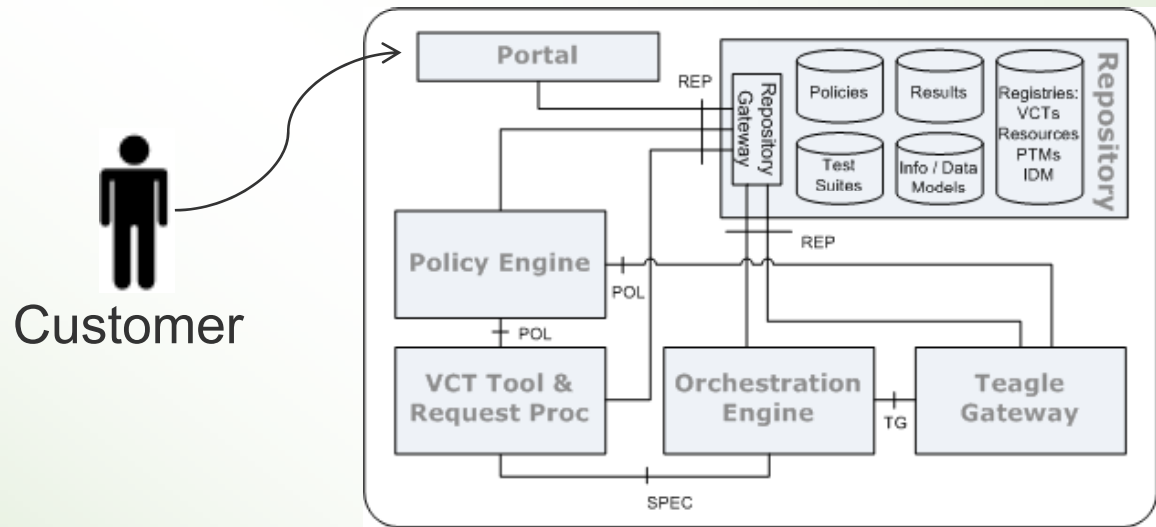


**Panlab**  
**Pan-European Laboratory**  
**(European Federation of Testbeds)**  
**Architecture**

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Teagle



Panlab Testbed Manager



Resource Adaptor

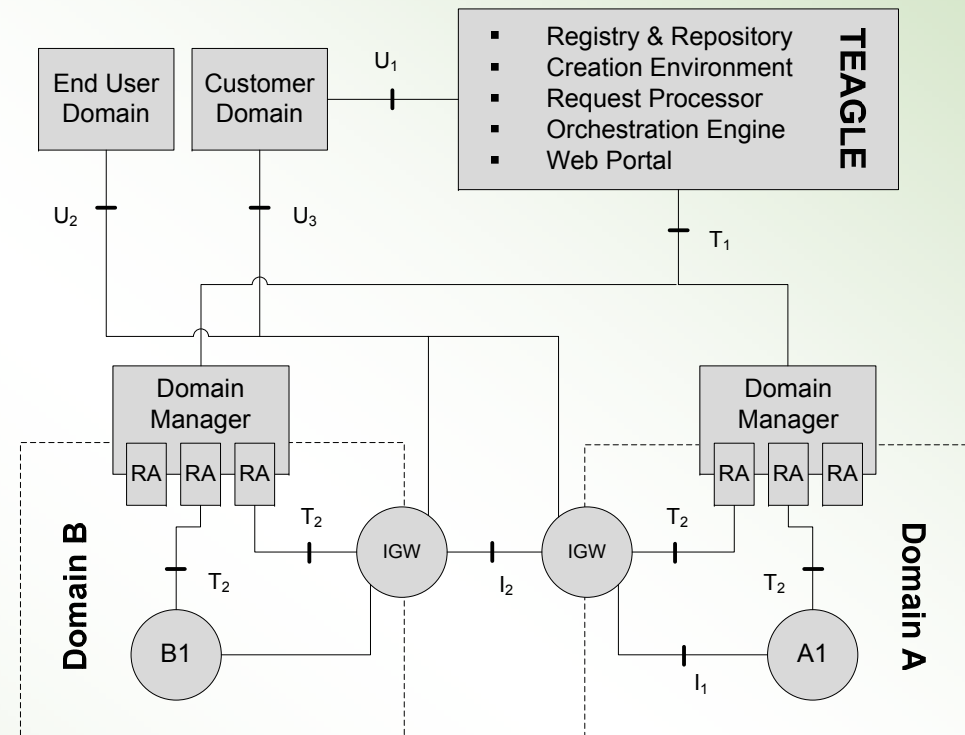


Resource

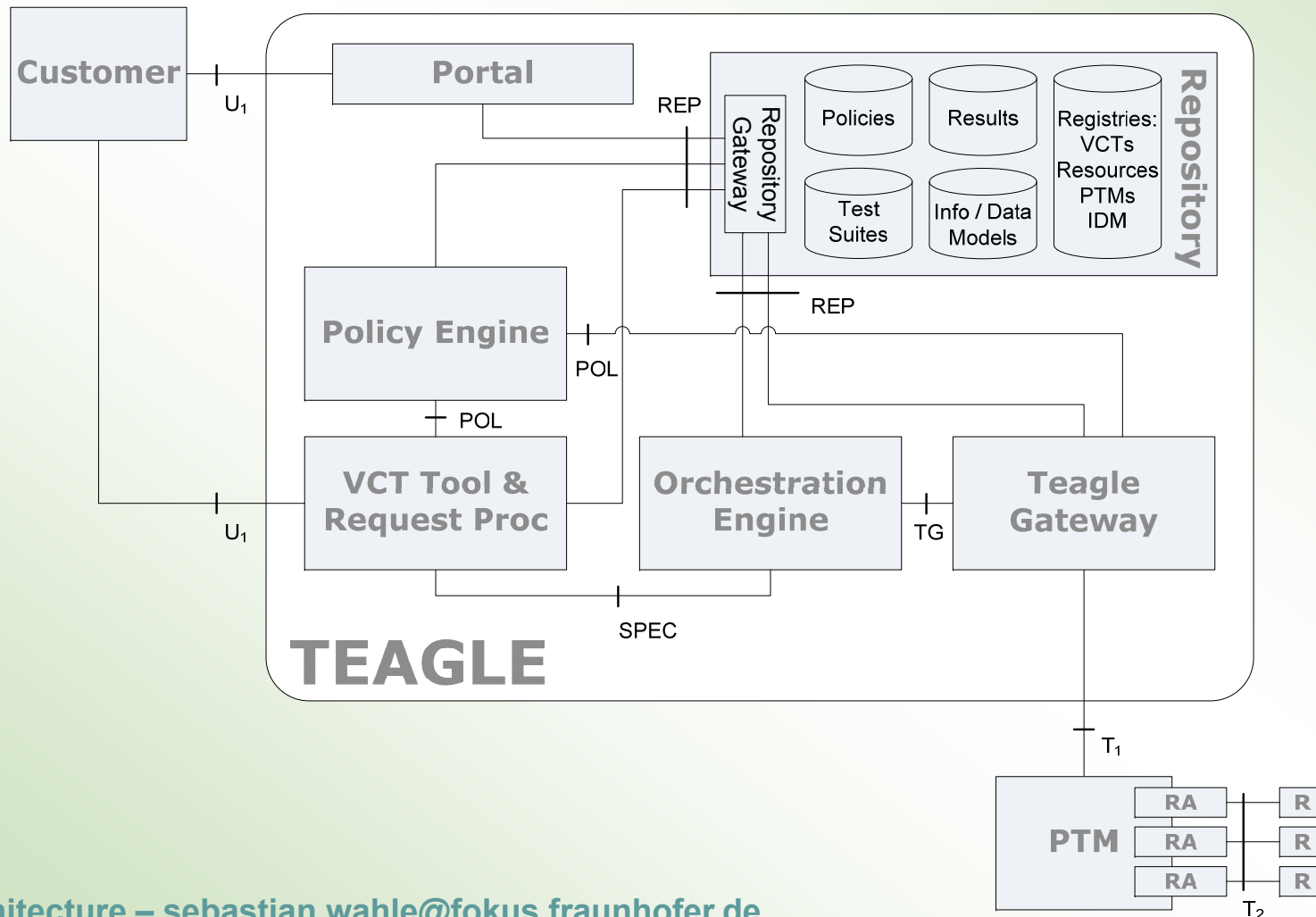
## Panlab Architecture



- ▶ Domain Managers control resources inside a domain
- ▶ Resource adaptors (RA) are used as devices drivers to translate federation level management commands to resource specific communication (e.g. SNMP, CLI, proprietary)
- ▶ Teagle instructs domain managers via a common control framework (interface T1)
- ▶ Teagle provides user interfaces for infrastructure design, configuration, and setup



# Teagle Architecture



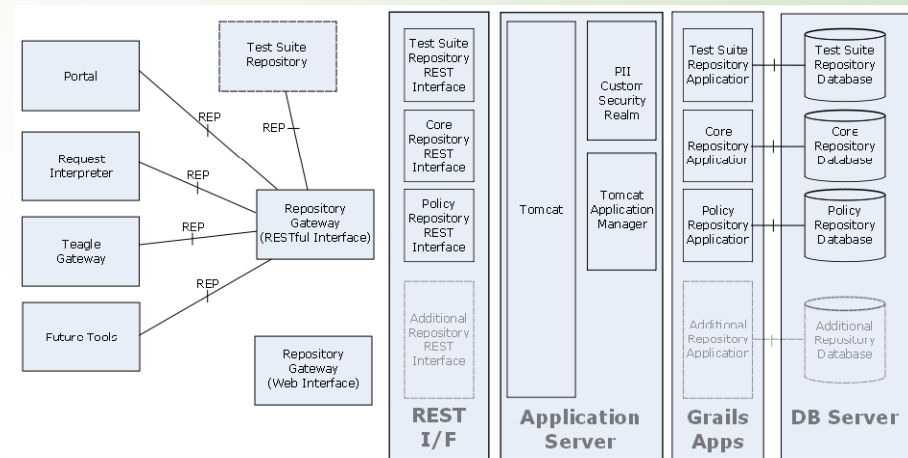
## Teagle Portal

- ▶ Primary contact point for customers and partners
- ▶ Customers can:
  - Launch the VCT tool to create VCTs
- ▶ Partners additionally can:
  - Manage their resources, VCTs, policies, and PTMs
- ▶ Tutorials section including videos and tutorial announcements
- ▶ News section

The screenshot shows the Teagle Portal website. At the top left is the Panlob logo with the tagline "Pan European Laboratory Infrastructure Implementation". To the right are links for "Contact", "Search", and "Sitemap". Below the header is a navigation bar with "back to Panlab" and "Teagle Home". The main content area is divided into three columns. The left column contains a sidebar with a "Teagle" menu (Home, News, Results Repository, Tutorials, Members Area) and an "Info" section stating "You are not logged in. Create account or login". The middle column contains a welcome message, a "What is a Private Virtual Test Lab?" link, a "What is Teagle?" link, and a "How to get started?" link. The right column features a "hosted by" section with the Fraunhofer FOKUS logo, a "supported by" section with logos for TU and AV, a "News" section with two entries: "PII cluster training event in Barcelona" (dated 2010-06-18) and "Teagle Tutorial at Tridentcom 2010" (dated 2010-06-14), and an "RSS Feed" section with a "Teagle RSS Feed" link. At the bottom of the page are links for "Linking Policy", "Publishing Notes", and "Data Protection".

## Teagle Repository

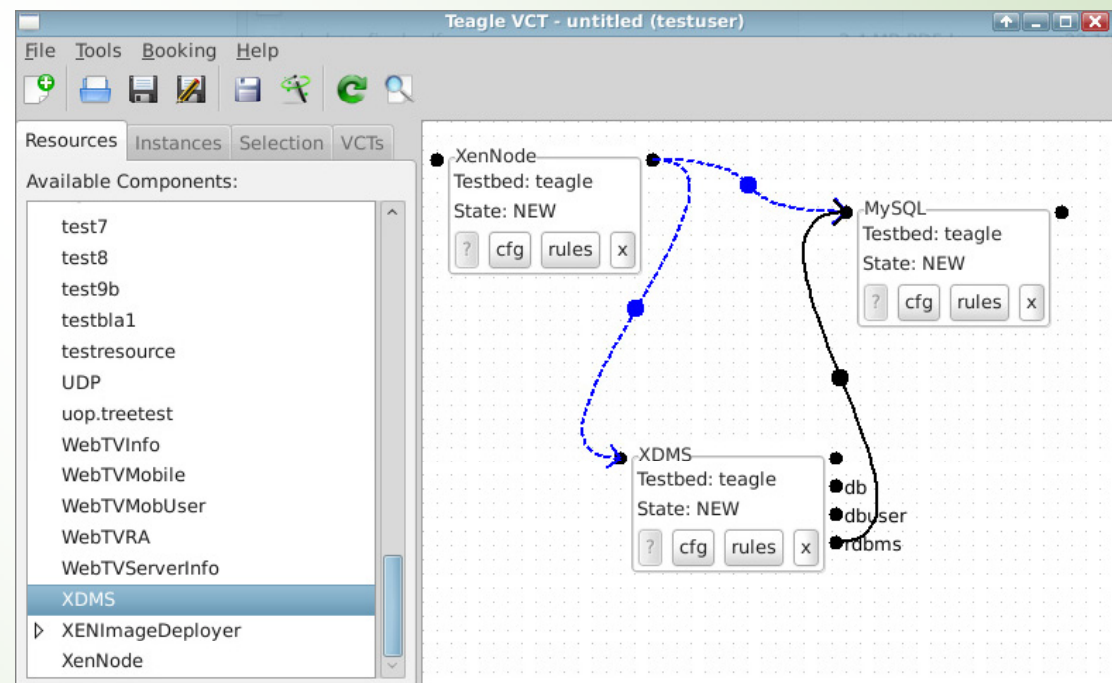
- ▶ Common Information Model for high-level agreement across a tool set
  - ➔ DEN-ng used for autonomic network management
  - ➔ Important Core Abstractions
  - ➔ Service/Resource description
  - ➔ Policy (and mediation)
  - ➔ User and Organization profiles
  - ➔ Test Suite Management
- ▶ Domain Specific Data Models for separation of concerns
  - ➔ Pick and group relevant pieces of the information model
  - ➔ Construct appropriate data models



- ▶ Repository is made of many applications, each with its own storage and RESTful Interface
- ▶ Clean separation of concerns
- ▶ Communication is stateless

## VCT Tool

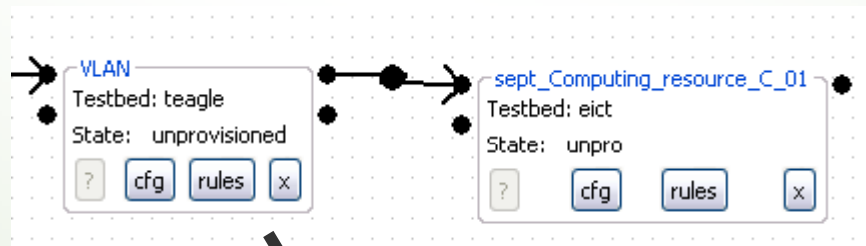
- ▶ Java Web Start application
- ▶ Enables configuration and deployment of VCTs
- ▶ communicates at startup and during runtime with the repository
  - User settings
  - Available resources
  - Saved testbeds from previous sessions
  - Bookings
- ▶ Communicates with policy engine request processor and OE



# Orchestration Engine: Overview

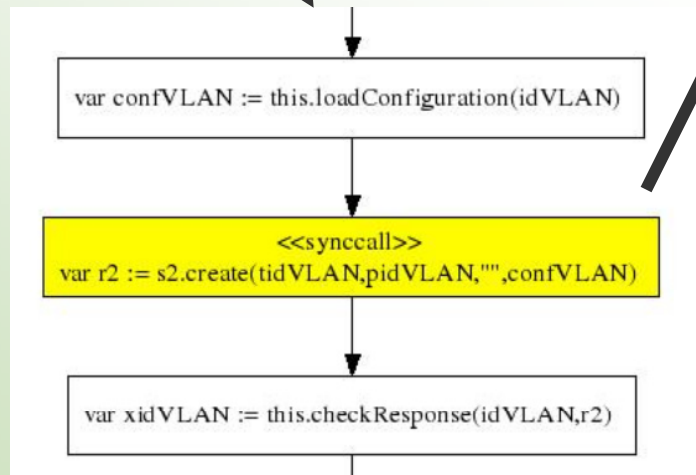
- ▶ The Orchestration Engine is in charge of controlling the sequencing of calls to testbeds to realize the booking of requested resources (multi-domain)
- ▶ Its role is:
  - Transform a topology-oriented VCT specification into an executable workflow script
  - Launch the execution of the scripts to realize the actual provisioning of resources, report on instantiated resources
- ▶ It is connected to:
  - VCT Tool (Request Processor) to receive the input VCT models
  - Teagle Gateway to access PTMs
- ▶ Exploits SOA (Booking requests become Services)

## Orchestration Engine: Transforms VCT design into executable script



*Transforming*

*Executing*



```
***** PTM CALL *****
Date: Mon Sep 21 16:19:47 2009
ENDPOINT: http://62.38.216.70:9000/teaglew/share
POST /share.top-0
<vlan>
  <sept_computing_resource_b_1 type="reference">
    uop.sept_computing_resource_b_1-7
  </sept_computing_resource_b_1>
  <sept_asterisk_1 type="reference">
    uop.sept_asterisk_1-7
  </sept_asterisk_1>
</vlan>

200 OK
<?xml version="1.0" encoding="utf-8"?>
<vlan><uuid type="string">uop.vlan-8</uuid></vlan>
```

**Transforming:** Ordering create/update calls Based on ref/containments dependencies

**Executing:** Issuing HTTP Requests to PTMs Through TGW using REST approach

# Teagle Gateway

- ▶ The current installation of the Teagle GW provides two interfaces:
  - TG (REST based) that is used by OE  
[http://62.103.214.70:9000/teaglegw/{ptm\\_id}/{resource\\_id}](http://62.103.214.70:9000/teaglegw/{ptm_id}/{resource_id})
  - T1 (SOAP-WS) that is used by the PTMs  
<https://62.103.214.70:8070/axis/services/TeagleGW>
- ▶ Communications over T1 have been enhanced and allow for:
  - Establishment of SSL channels that require mutual authentication of TGW and PTMs
  - Notifications to be sent from the PTMs to TGW
- ▶ Asynchronous requests from the OE can be supported, the immediate response acknowledges reception of the request and the actual outcome is collected via a notification sent by the involved PTM

## Teagle Gateway

- ▶ Heartbeat monitoring of PTMs (status: OK, SSL Problem, PTM Offline, RAL Offline) – <http://62.103.214.70:9000/teaglegw/>
- ▶ Status checked before forwarding any requests
- ▶ Notifications from PTMs collected by the TGW:
  - Resource Adaptor Installation/Removal
  - Resource Instantiation/De-allocation
  - Availability of Resource Type
- ▶ Currently Resource Instantiation can trigger TGW internal processes for adding the relevant entry in the Repository
- ▶ Resource Adaptor Installation/Removal can be also reflected on the Repository
- ▶ Repository entries are enumerated for discovering PTMs
  - Digital Certificates based trust needs to be established prior any communications

# Policy Engine

- ▶ Personalisation of the system according to specific preferences without necessary alterations on the core system.
  - Policies defined for specific situations of which evaluation may trigger actions to be executed by the core system.
  - Implementation based on OMA PEEM specification. Policy language based on the Common Policy Format (RFC 4745).
- ▶ Policies represent a logical set of rules. Are identified by:
  - Identity (user, resource) or a group of identities (organization)
  - Scope of the identity relative to the operation (“originator” or “target”).
  - Operation that triggered the evaluation request (e.g. bookResource)
- ▶ A rule consists of :
  - conditions define the scope of the rule and constraints on the input data.
  - actions define the behaviour which should be enforced by requesting entities.

## Policy Engine

- ▶ During the evaluation process, the rules of the associated policies are evaluated. The policy evaluation is explicitly triggered through the PEM1 interface by:
  - *VCT Tool* requests for policy evaluation and executes the result actions by:
    - Restricting display/booking of the resources (operation bookResource).
    - Restricting combinations of resources in a connection (operation connectResources).
  - *PTM* requests for policy evaluation and executes the result actions by :
    - Setting firewall filters after provisioning resources (currently on going work).
- ▶ Policies are stored in the Teagle Repository:
  - OrganisationAccessPolicies defined for the organizations of the identities and the identity scopes “target” or ”originator”. It also includes polices defined for “all” identities and “all” identities scope.
  - ResourceAccessPolicy, UserAccessPolicy defined for the identities of type resource, respectively user and the identity scopes “target “or “originator”.
  - RoleAccessPolicy defined for different user roles and the identity scopes ”target” or “originator”.



**Thank you for your attention!**

**Contact: [www.panlab.net](http://www.panlab.net)**