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Secure Cloud Management Platform

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Secure Cloud Management Platform
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Firme

Autore: Product Owner IPT di Sviluppo R. Cloud Product Digital Systems & Engineering Technologies Engineering Carmelo Sciuto
Verifica: PEM IPT di Prodotto R. Digital Systems & Engineering Technologies Engineering Andrea Giorgio Busà
Verifica: PAM IPT Sviluppo Quality Cyber Security, Intelligence & Digital Solutions Simonetta De Biase
Approvazione: IPT Leader IPT di Sviluppo R. Digital Platform Digital Systems & Engineering Technologies Engineering Daniele Leone
Approvazione: Technical Authority Solution Architects LoB Public Admin., Defence & Inter. Agencies Susanna Fortunato
Autorizzazione: Product Manager IPT Prodotto Product Management Digital Trasformation Product Management Fabio Russo

Contatti

Carmelo Sciuto Product Owner IPT di Sviluppo R. Cloud Product Digital Systems & Engineering Technologies Engineering	Leonardo S.p.A. Via A. Agosta SNC 95121 Catania
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02.00	DCN222372	29/07/2022	Integrazione Rilascio SCMP 2.0.0	D. Leone
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Super Project Documentation (EN)

☒ Installation and Deploy

Getting Started

The Secure Cloud Management Platform solution, in line with Gartner's definition indicated in the Reference Documents, is an operational platform that enables the governance, lifecycle management, brokering, and automation of resources managed in a cloud environment.

Requirements

The SCMP solution is designed to run exclusively in Kubernetes environments compliant with the supported versions indicated in the section Supported Kubernetes Versions.

Installation requires the availability of an existing Kubernetes cluster (upstream or managed service) or OpenShift Container Platform, equipped with the necessary resources to host the platform's core components.

In OpenShift environments, it is possible to leverage the benefits of Red Hat certified operators. Alternatively, it is possible to use upstream or managed Kubernetes clusters (EKS, AKS, GKE) with Helm v3.

Recommended Sizing

To ensure optimal performance, it is recommended that the Kubernetes cluster has nodes with the following minimum characteristics:

Type	Role	#qty	vCPU	Memory (GB)	Disk (GB)	Notes
Node	Control Plane	3	8	16	128	Respect native Kubernetes HA
Node	Infra	3	12	24	628	For ingress, logging, monitoring services
Node	Worker	4	8	32	128	For SCMP modules and user workloads

⚠ **Note:** Node quantities and sizes may vary based on environment size, number of SCMP modules installed, and workloads to be managed.

Other Requirements

- **Helm v3** installed and configured.
- Access to Helm repositories and container registries indicated in the next section.
- Outbound network connectivity (port 443) to the Internet and APIs/consoles of supported cloud providers.
- Persistent Storage available via `StorageClass` compatible with Kubernetes `PersistentVolumeClaim` (NFS, Ceph, Portworx, EBS, Azure Disk, etc.).



The SCMP platform is supported on Kubernetes and OpenShift in the following versions:

Platform	Supported Version(s)	Notes
OpenShift Container Platform (OCP)	≥ 4.14	Recommended to use versions ≥ 4.14 to ensure compatibility with certified operators
Kubernetes Upstream	≥ 1.25	Supported with Helm v3; recommended to use versions ≥ 1.26
Amazon EKS (Elastic Kubernetes Service)	≥ 1.25	Validated support for managed EKS environments
Azure AKS (Azure Kubernetes Service)	≥ 1.25	Validated for managed AKS environments
Google GKE (Google Kubernetes Engine)	≥ 1.25	Validated for managed GKE environments

To perform the installation correctly, access to the following repositories is required:

- Repository Leonardo
- repository charts k8s

Furthermore, it is necessary to verify that the environment can make requests to the consoles and APIs provided by the providers that will be used.

Storage Considerations

Network Connectivity

Components

In this section, we define all the components necessary for the SCMP to function. The "required" elements must be installed before the various SCMP modules as explained in the "Installation" section.

PREREQUISITES

- Nginx Ingress Controller
- Cert Manager
- Minio Operator
- Strimzi Operator
- MongoDB Operator
- Vault AutoUnseal



MODULES

Common Ports & Requirements

Communication Data

To update data, the SCMP uses a series of cron-jobs, divided by reference provider and relevant module. Specifically, we can identify:

Type	Launched every	Activity performed
Inventory	1 hour	Retrieves all inventory resources available on the provider
Costs	24 hours	Retrieves costs for the last 2 days for resources available on the provider (multiple days are retrieved to validate data)
Monitoring	24 hours	Retrieves monitoring information for the provider's resources
Catalog	24 hours	Retrieves catalog resources/SKUs from the provider, allowing their use in the SCMP
Security	24 hours	Retrieves compliance and security information for available providers

Supported Locales

Currently, the languages supported by SCMP are:

- Italian
- English

It is possible to change the language used by following these steps

Installation

In this section, you can find the order and the necessary steps to perform a complete and functional installation.

Installation Overview

1. Log in to the necessary Helm registries using this code: `helm registry login leonardocharts.azurecr.io --username leonardocharts --password $PASSWORD`
2. Install the prerequisites



3. Install a MongoDB instance (if not available, "MongoDB Operator" can be used)
4. Configure the necessary parameters for the Leonardo vault-autounseal chart as indicated in the code section.

```
global:  
  OpenShift: true  
  imagePullSecrets:  
    - name: acr-secret-cs  
      credentials: # specify the credentials for the image registry if you want to create the pull secret automatically  
      - registry: $DOCKER_REGISTRY  
        username: $DOCKER_REGISTRY_USERNAME  
        password: $DOCKER_REGISTRY_PASSWORD  
        email: ignorethis@email.com  
  # The `namespace` key is needed by the official Vault chart in order to load the resources in the appropriate namespace  
  # and it has to adhere to our naming scheme '<tenant>-<suffix_namespace>'  
  namespace: scmp-vault  
  tenant: scmp  
  suffix_namespace: vault
```

5. Install the newly configured Leonardo vault-Autounseal chart using the code. helm install vault-autounseal vault-autounseal
6. **After the completion of the vault-autounseal installation (i.e., when vault-prod pods are already available in the cluster), configure the SCMP installation parameters as in the code.

```
global:  
  tenant: scmp  
  imagePullSecrets:  
    - name: acr-secret-cs  
      credentials: # specify the credentials for the image registry if you want to create the pull secret automatically  
      - registry: $DOCKER_REGISTRY  
        username: $DOCKER_REGISTRY_USERNAME  
        password: $DOCKER_REGISTRY_PASSWORD  
        email: ignorethis@email.com  
  minio:  
    accesskey: "minioadmin"  
    password: "minioadmin123!"
```

7. Launch the SCMP installation using the newly modified chart; to launch it, we can use: helm install scmp scmp/

Perform Configurations

After the installation, configuration steps are required, as described in the Appliance Setup section.

Upgrades & Maintenance



Additional Configuration Options

Load Balancer Configuration

Proxies

SSL Certificates

Data Encryption

Initial Appliance Setup

Appliance Setup

Network Configuration

- Enable the ingress controller to expose services on the network.
- (optional) Create a DNS name to facilitate connection to the system.

Keycloak Setup

- Configure Realm theme on Keycloak
- Create client 'microfe' on Keycloak Realm:
- Enable 'Implicit Flow'
- Set 'Valid Redirect URIs' to:
 - `http://localhost:3000/*`
 - SCMP host domain

Content Management

- Upload micro frontends in singlespa bucket
- *Alternatively:* Use minio-uploader utility chart
- Upload micro frontends config in singlespa-config bucket
- *Alternatively:* Use minio-uploader utility chart

Access Control

- Set anonymous read-only access on Minio buckets:
- singlespa
- singlespa-config



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- config
- Configure IAM users and roles, as indicated in the IAM User Creation section.

WIP

This page is being updated, the information has not yet been validated

2 Authentication

The "Authentication" functionality allows interaction with the IAM to modify user profiling.

For preliminary configurations, refer to the specifications indicated in document DI-IPSC-81443, included in the reference documents table.

The menu is accessible from the button at the top right, as shown below.

Specifically, to access user profiling, the menu is "Authentication".



Figura 1 – Access to Authentication functionality

Dashboard view for user profiling:



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The screenshot shows the IAM Dashboard with the following sections:

- Entities:** Includes links for Users, Groups, Roles, Applications, Modules, Components, Features, Fields, Data Filters, and Fields Container.
- Associations:** Includes links for Feature X User/Group, DataFilter X User/Group, Field X User/Group, and GroupUserTree.
- Validations List:** Shows a list of validations.
- Administrations:** Includes links for User Management X Pages, Pages Management, App X User/Group, and Supports.

Figura 2 – IAM Dashboard

2.0.1 Groups

To simplify the assignment of menu attributes and authorizations, user groups can be used. Click the "Groups" menu in the "Entities" section of the IAM dashboard.

The screenshot shows the IAM Dashboard with the "Groups" link highlighted with a red arrow. The "Entities" section includes links for Users, Groups, Roles, Applications, Modules, Components, Features, Resources, Data Filters, and Resources Container.

Figura 3 – Access to Group management



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Once the link is clicked, the user will be shown the list of all available groups on the portal with their respective configuration buttons.

The screenshot shows a dark-themed web interface for managing groups. At the top, there's a header with the Leonardo logo, the date (13.4.136 25 march 2024), and user information (admin admin). Below the header, a navigation bar includes links for Dashboard, Entities, Associations, Validations List, Administration, IAM, Entities, and Groups. The Groups section is currently active. A prominent red button labeled "+ ADD NEW GROUP" is located in the top right corner of the main content area. The main content area displays a table of existing groups with columns for Group Name and Actions. Each group entry includes a search icon, a pencil icon for editing, a copy icon, and a delete icon. The table lists groups such as IamAdministrators, CmpTenantsAdmin, CmpAdministrator, CmpViewer, IamUsers, ETD-x2030, CmpProvisioner, ant_istanze_handler, Qualifier Admin, and IamUsersAdministrator. A "Search Group" input field is positioned above the table. At the bottom left, there's a dropdown menu set to "10".

Figura 4 – List of configured groups

2.0.1.1 Group Creation

To create a new group within the system, click the "+" button in the top right. A group creation form will be displayed.

This screenshot is identical to Figure 4, showing the list of configured groups. However, a large red arrow points to the "+ ADD NEW GROUP" button in the top right corner of the main content area. This visual cue indicates where the user should click to start the process of creating a new group.

Figura 5 – Adding a new Group



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Enter the group name and click the "Add Group" button to add it to the system. Once pressed, the system will take us to the list of available groups where we can find the newly created group.

The screenshot shows the 'Add Group' page. At the top, there's a header with the Leonardo logo and navigation links for Dashboard, Entities, Associations, Validations List, and Administration. Below the header, the IAM section is selected. Under IAM, the Entities tab is active, and 'Groups' is chosen. A sub-menu item 'Add Group' is highlighted. The main content area has a form with a single input field labeled 'Name' containing 'Insert Name'. At the bottom of the form are two buttons: a grey 'BACK' button and a white '+ ADD GROUP' button with a black outline.

Figura 6 – Group entry parameters

2.0.1.2 Management of Assigned Users and Attributes

To assign users to a group, from the list of available groups, click the "people" icon on the row corresponding to the group of interest. The user will be redirected to the "Members" page where it is possible to view all users assigned to the group and their basic information.

The screenshot shows the 'Groups' page. At the top, there's a header with the Leonardo logo and navigation links for Dashboard, Entities, Associations, Validations List, and Administration. Below the header, the IAM section is selected. Under IAM, the Entities tab is active, and 'Groups' is chosen. A sub-menu item 'Groups' is highlighted. The main content area displays a table of groups. The columns are 'Group Name' (listing IamAdministrators, CmpTenantsAdmin, CmpAdministrator, CmpViewer, IamUsers, ETD-x2030, CmpProvisioner, ant_istanze_handler, Qualiczer Admin, IamUsersAdministrator) and 'Actions' (containing icons for search, edit, delete, and user assignment). A red arrow points to the 'Actions' column for the 'IamAdministrators' group, specifically to the user assignment icon. There's also a 'Search Group' input field and a 'EXPORT LIST TO .CSV' button at the top left.

Group Name	Actions
IamAdministrators	
CmpTenantsAdmin	
CmpAdministrator	
CmpViewer	
IamUsers	
ETD-x2030	
CmpProvisioner	
ant_istanze_handler	
Qualiczer Admin	
IamUsersAdministrator	

Figura 7 – Access to user assignment management



We can add a user to the group by clicking the "+" button at the top right (1). Once pressed, a new row (2) will be created in the list of assigned users where a user can be selected from the list of available users (3).

User	First Name	Last Name	Username	Email	Actions
cmp_tenant_admin	cmp_tenant_admin	cmp_tenant_admin	cmp_tenant_admin	cmp_tenant_admin@email.com	

Figura 8 – Assign a user to the group

Similarly, it is possible to remove users from the group by clicking the "Trash" button corresponding to the user to be removed.

After adding all users to the group, click the "Save" button at the bottom left to save the changes. A save confirmation modal will be displayed.

We can assign attributes to the group that will be automatically used by the assigned users. To do this, select the "Attributes" tab at the top of the page (1), then using the "+" button at the top right (2), it is possible to add an attribute. In the left part, the key must be entered (3) and in the white part on the right, its value must be entered (4). During entry, we will see a dropdown below the field where clicking will allow saving the entered value (5).

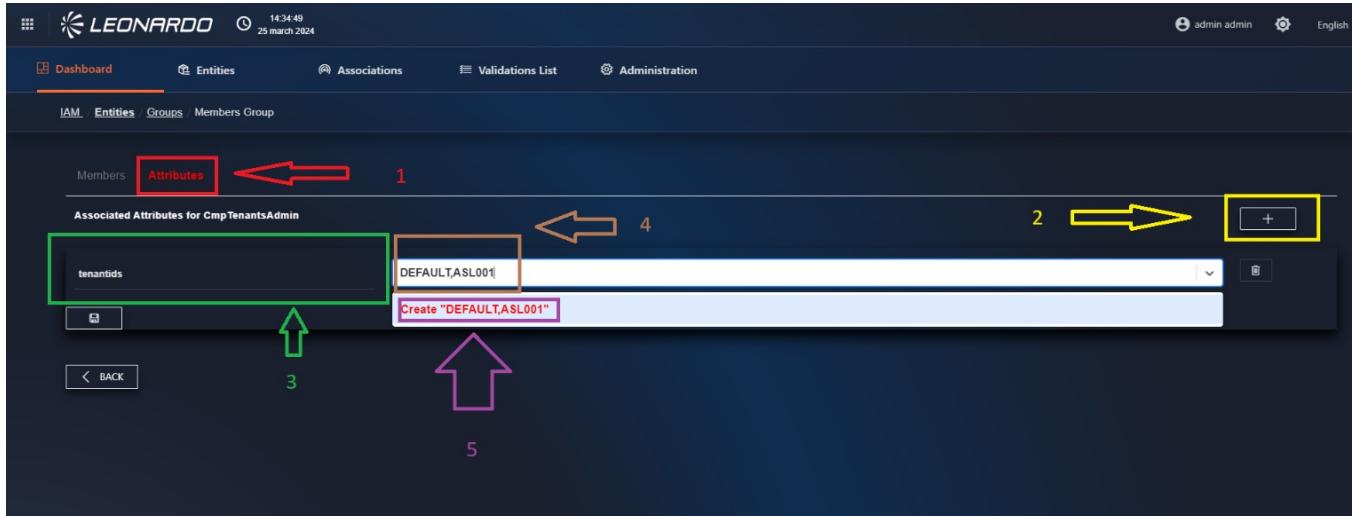


Figura 9 – Enter Attributes

Once all necessary attributes have been entered, changes can be saved using the "Save" button at the bottom.

To return to the list of available Groups, click the "Back" button present on each page.

2.0.1.3 Viewing, Modifying, and Deleting a Group

From the list of available Groups, a series of buttons are available for each group:

- "Magnifying glass": allows viewing group information (indicated by a red arrow in the image);
- "Pencil": allows modifying the group's basic information (indicated by a yellow arrow in the image);
- "Trash": allows deleting the group after clicking "confirm" in the displayed modal (indicated by a purple arrow in the image).



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The screenshot shows the SCMP IAM dashboard with the 'Entities' tab selected. The main area displays a list of user groups. Each group entry includes a 'Group Name' (e.g., 'lamAdministrators', 'CmpTenantsAdmin', etc.), a set of control buttons (including edit, delete, and search icons), and a 'Search Group' input field. An 'EXPORT LIST TO .CSV' button is located at the top left of the list. The top navigation bar includes links for Dashboard, Entities, Associations, Validations List, Administration, and a user admin icon.

Group Name	Action Buttons	Search Group
lamAdministrators		<input type="text"/>
CmpTenantsAdmin		<input type="text"/>
CmpAdministrator		<input type="text"/>
CmpViewer		<input type="text"/>
lamUsers		<input type="text"/>
ETD-x2030		<input type="text"/>
CmpProvisioner		<input type="text"/>
ant_istanze_handler		<input type="text"/>
Qualiezer Admin		<input type="text"/>
lamUsersAdministrator		<input type="text"/>

Figura 10 – Control buttons

2.0.2 Users

For an account to access and use the system, it must be appropriately configured. Below, we will see the process of creating and managing a user within the SCMP using IAM as an access control application.

To access User management, click the "Users" menu in the "Entities" section of the IAM dashboard.



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The screenshot shows the Leonardo Secure Cloud Management Platform dashboard. At the top left is the Leonardo logo. To its right are the dates "10:30:17" and "26 march 2024". On the far right are user information ("admin admin") and language settings ("English"). Below the logo is a navigation bar with tabs: Dashboard, Entities, Associations, Validations List, and Administration. The "Dashboard" tab is active. Underneath the tabs is a sub-menu for "IAM - Dashboard" with options: Entities, Users (highlighted with a red box and arrow), Groups, Roles, Applications, Modules, Components, Features, Resources, Data Filters, and Resources Container. To the right of this menu are four cards: "Associations" (listing Feature X User/Group, DataFilter X User/Group, Resources X User/Group), "Validations List" (empty), and "Administrations" (listing User Management X Pages, Pages Management, App X User/Group, Supports).

Figura 11 – Access to User management

Once the link is clicked, the user will be shown the list of all available groups on the portal with their respective configuration buttons.

The screenshot shows the "Users" page of the Leonardo Secure Cloud Management Platform. At the top left is the Leonardo logo. To its right are the dates "10:31:59" and "26 march 2024". On the far right are user information ("admin admin") and language settings ("English"). Below the logo is a navigation bar with tabs: Dashboard, Entities, Associations, Validations List, and Administration. The "Entities" tab is active. Underneath the tabs is a sub-menu for "IAM - Entities" with options: Users (highlighted with a red box and arrow), Groups, Roles, Applications, Modules, Components, Features, Resources, Data Filters, and Resources Container. The main area displays a table of users:

Username	Last Name	First Name	Email	Actions
iam_admin	admin	admin	iam_@com	
cmp_admin		cmp_admin		
cmp_api_test	testing	api e upath	giamr@y.com	
andrea.caruso	Caruso	Andrea	an@com	
cmp_otp	otp	otp	giamr@com	
expertise_admin	Admin	Expertise	ex@com	
andrea.buso	Andrea	Busà	and@iny...com	
cmm_admin	admin	cmm	cmm@com	
cmp_administrator	admin	cmp	cmp@.com	
cmpdemo	DEMO	Utente	cmg@com	

At the bottom of the table are pagination controls: "10", "1", "2", "3", and a "next" arrow. To the right of the table is a search bar labeled "Search User".

Figura 12 – List of configured users



2.0.2.1 New User Creation

To create a new user within the system, click the "+" button at the top right. A user creation form will be displayed.

Username	Last Name	First Name	Email	Actions
iam_admin	admin	admin	iam_admin@gmail.com	
cmp_admin		cmp_admin		
cmp_api_test	testing	api e uipath	giammarco.piccoli.ext2@leonardocompany.com	
andrea.caruso	Caruso	Andrea	andrea.caruso@leonardo.com	
cmp_otp	cmp	otp	giammarco.piccoli.ext@leonardo.com	
expertise_admin	Admin	Expertise	expertiseadmin@leonardo.com	
andrea.busà	Andrea	Busà	andrea.busà@cybersecurity.leonardocompany.com	
cmm_admin	admin	cmm	cmm@leonardo-cmm.com	
cmp_administrator	admin	cmp	cmp@leonardo.com	
cmpdemo	DEMO	Utente	cmpdemo@email.com	

Figura 13 – New user creation

The new user creation form will be displayed. Fill in the mandatory fields in the list:

- E-mail: the user's valid e-mail address.
- Username: the username to be used as the account for portal access.
- First Name: User's first name.
- Last Name: User's last name.
- Password: Password of at least 8 characters to be used for access.
- Max concurrent connections: Maximum number of simultaneous connections enabled for the user.
- Default Language: the basic language to be displayed in the system.



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The screenshot shows a user interface for creating a new user. At the top, there's a header bar with the Leonardo logo, the date '26 march 2024', and a timestamp '10:34:50'. On the right side of the header are user profile icons for 'admin admin' and language selection for 'English'. Below the header, a navigation menu has 'Entities' selected. Under 'Entities', there are links for 'IAM', 'Entities', 'Users', and 'Add User'. The main content area is titled 'User creation form'. It contains several input fields: 'Email' (placeholder 'Insert Email'), 'Username' (placeholder 'Insert Username'), 'First Name' (placeholder 'Insert First Name'), 'Last Name' (placeholder 'Insert Last Name'), 'Data access level' (placeholder 'Insert Data access level'), 'Organization' (placeholder 'Insert Organization'), and 'Assigned role' (placeholder 'Insert Assigned role').

Figura 14 – User creation form

Once all mandatory fields are entered, click the "+ Add user" button to complete the entry.

A confirmation message will be displayed, and the page will reset to allow the entry of a new user.

To view the newly created user, return to the page containing the list of users.

2.0.2.2 Role and Attribute Assignment

To manage users, you can click the "Groups" button corresponding to the row of the user to be modified.



Username	Last Name	First Name	Email	Actions
iam_admin	admin	admin	iam_admin@gmail.com	
cmp_admin		cmp_admin		
cmp_api_test	testing	api e uipath	giammarco.piccoli.ext2@leonardocompany.com	
andrea.caruso	Caruso	Andrea	andrea.caruso@leonardo.com	
cmp_otp	cmp	otp	giammarco.piccoli.ext1@leonardo.com	
expertise_admin	Admin	Expertise	expertiseadmin@leonardo.com	
andrea.busà	Andrea	Busà	andrea.busà@cybersecurity.leonardocompany.com	
cmm_admin	admin	cmm	cmm@leonardo-cmm.com	
cmp_administrator	admin	cmp	cmp@leonardo.com	
cmpdemo	DEMO	Utente	cmpdemo@email.com	

Figura 15 – Access to user management

Once the button is pressed, the page refreshes to show the "Groups" page where one or more groups can be assigned to or removed from the user.

To add a new group to the user, you must select the group to be assigned to the user in the left section (1) and then, by clicking the "Associate" button in the center of the page (2), the group will automatically move to the right section and the changes will be saved automatically.



The screenshot shows the 'Associations' section for a user named 'cmp_api_test'. On the left, a list of 'Associated Groups' is shown, with 'CmpTenantsAdmin' selected and highlighted by a red box. On the right, a 'User Groups' section displays a single item, 'CmpAdministrator', with a priority of 1. A yellow box highlights the 'User Groups' section. Red arrows point from the 'CmpTenantsAdmin' entry in the list to the 'Associate' button, and a yellow arrow points from the 'Associate' button to the 'User Groups' section.

Figura 16 – Associate a user to the group

Similarly, it is possible to remove the user from the group by first clicking the group to be removed in the right section and then the "Disassociate" button in the center of the page. The changes will be saved automatically.

The screenshot shows the 'Associations' section for a user named 'cmp_api_test'. On the left, a list of 'Associated Groups' is shown, with 'CmpTenantsAdmin' selected and highlighted by a red box. On the right, a 'User Groups' section displays a single item, 'CmpAdministrator', with a priority of 1. A yellow box highlights the 'User Groups' section. Red arrows point from the 'CmpTenantsAdmin' entry in the list to the 'Dissocia' button, and a yellow arrow points from the 'Dissocia' button to the 'User Groups' section.

*Figura 17 – Disassociate a user from
the group*

Furthermore, using the buttons in the right section, corresponding to each group, it is possible to modify the priority of the various groups.

For users, it is also possible to assign custom attributes. To do this, select the "Attributes" tab at the top of the page (1), then using the "+" button at the top right (2), it is possible to add an attribute. In the left part, the key must be entered (3) and in the white part on the right, its value must be entered (4). During entry, we will see a dropdown below the field where clicking will allow saving the entered value (5).

The list of available attributes is in the paragraph.

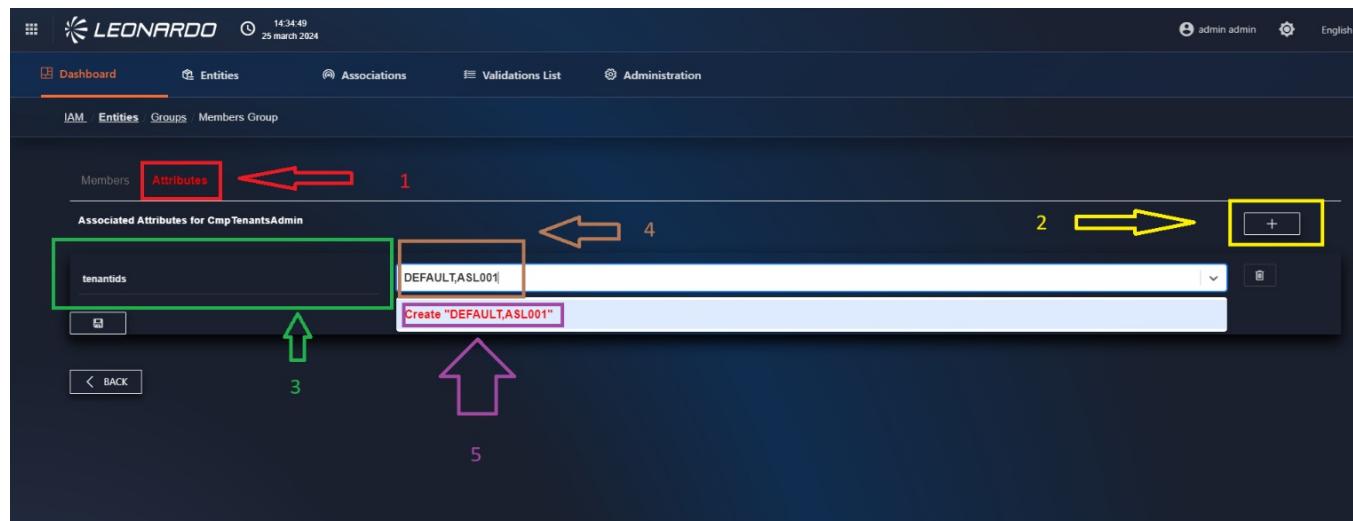


Figura 18 – Enter Attributes

Once all necessary attributes have been entered, changes can be saved using the "Save" button at the bottom.

2.0.2.3 Credential Reset

As a user administrator, it is possible to reset passwords. To do this, click on the "Credentials" tab displayed at the top of the page. In this tab, you can enter a new password for the user and configure it as "Temporary". The temporary password must be changed by the user after the first login. A password validity period, expressed in days, can also be defined.



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The screenshot shows a dark-themed web interface for managing user credentials. At the top, there's a header with the Leonardo logo, the date '26 march 2024', and a timestamp '12:01:52'. Below the header, a navigation bar includes links for Dashboard, Entities, Associations, Validations List, and Administration. Under the Associations link, it says 'Group User Tree'. The main content area has tabs for Groups, Roles, Attributes, and Credentials, with 'Credentials' currently selected. A modal window is open, titled 'Password User cmp_api_test'. It contains fields for 'Temporary' and 'Expiration (days)', both of which are currently set to empty values. At the bottom of the modal is a button labeled 'EDIT PASSWORD'.

Figura 19 – Modifying the user's password

2.0.2.4 Viewing, Modifying, and Deleting a User

From the list of available users, a series of buttons are available for each group:

- "Magnifying glass": allows viewing user info (indicated by a red arrow in the image).
- "Pencil": allows modifying the user's basic information (indicated by a yellow arrow in the image).
- "Trash": allows deleting the user after clicking "confirm" in the displayed modal (indicated by a purple arrow in the image).



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The screenshot shows a list of groups on the 'Groups' tab of the IAM dashboard. The groups listed are: IamAdministrators, CmpTenantsAdmin, CmpAdministrator, CmpViewer, IamUsers, ETD-x2030, CmpProvisioner, ant_istanze_handler, Qualiezer Admin, and IamUsersAdministrator. Each group entry has a set of icons for search, edit, and delete operations. A red arrow points to the 'Search Group' input field at the top right of the list.

Figura 20 – Control buttons

2.0.3 Management of Menus Enabled per User/Group

The IAM system integrated into the SCMP also allows the management of menu elements available to various users and groups. To access this functionality, simply click the "User management X Pages" link available in the "Administration" section of the IAM dashboard.

The screenshot shows the 'Administration' section of the IAM dashboard. On the right side, there is a panel titled 'Administrations' which contains a link 'User Management X Pages'. This link is highlighted with a red box and a red arrow pointing to it. The rest of the dashboard includes sections for Entities, Associations, Validations List, and a sidebar with various menu items like Users, Groups, Roles, Applications, etc.



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Figura 21 – Access to menu management

At the top of the page, there are two dropdown menus: the left dropdown allows selecting a single user, and the right one allows selecting a group.

The screenshot shows a dark-themed web interface for managing users and groups. At the top, there's a header with the Leonardo logo, the date (26 march 2024), and a timestamp (14:19:50). Below the header, a navigation bar includes links for Dashboard, Entities, Associations, Validations List, Administration, IAM, Administration, and User Management X Pages. The main content area is titled 'Administration'. On the left, there are two search input fields: 'Search User' and 'Search Group'. The 'Search Group' field has a dropdown menu open, displaying a list of group names: IamAdministrators, CmpTenantsAdmin, CmpAdministrator, CmpViewer, IamUsers, ETD-x2030, CmpProvisioner, and ant_istanze_handler. The background of the page is dark blue, and the overall layout is clean and professional.

Figura 22 – Selection of user/group to modify

After selecting an account, the page will update to show all "STREAM" available on the application. It is possible to click the "+" button corresponding to each row to view the available "MODULES" and "COMPONENT".

The displayed component lists are automatically generated by the system using the configurations performed during installation.

For each component present, by clicking the dropdown menu on the corresponding row, it is possible to indicate its visibility (or lack thereof) to the user/group we previously selected.

The selectable values are:

- Enabled and default: only one default can be indicated per module. Selecting this option makes the selected page the main one; thus, upon clicking the menu, the user will be redirected to this page.
- Enabled: Indicates that the menu is visible and usable by the user/group.
- Disabled: Indicates that the menu will not be enabled and will not be visible to the user/group.

- N.D: not defined (the menu is disabled and will not be visible).

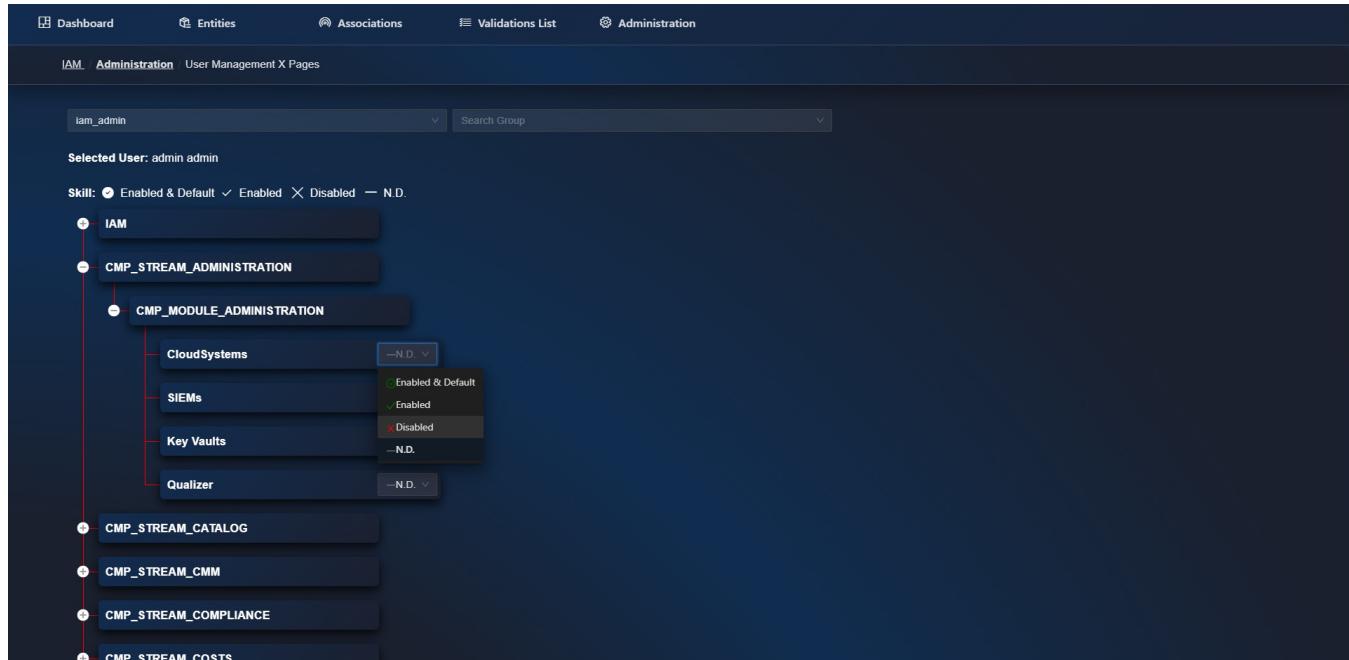


Figura 23 – Menu authorization management

2.0.4 User Profile Lists and Attributes

This section highlights the different types of users who can access and use the described product.

For each of them, a list of functionalities the user has been enabled for and can interact with is provided.

All attributes that can be assigned to Users and Groups are also indicated here.

2.0.4.1 Attributes

Attribute	Acceptable Values	Type	Description
Monitoring	Default, AS01, mase	String array	Enter the list of enabled tenants for the user, separated by commas between each tenant name.
Costs	true / false	Boolean	By enabling the attribute, we specify that the user can perform searches by TAG instead of using the tenant as a discriminant.



Attribute	Acceptable Values	Type	Description
Inventory	ADMIN / LIMITED	Enumeration	By entering ADMIN as the value, the user will be able to view both costs received from the provider and costs calculated by the SCMP. By entering LIMITED, only costs calculated by the SCMP will be viewable.
Inventory	Zona1	String	Mandatory parameter for tools used by IAM.

2.0.4.2 Administrator

Functionality	Create	Read	Undo	Delete
Monitoring	x	x	x	x
Costs	x	x	x	x
Inventory	x	x	x	x
Security	x	x	x	x
Dashboard	x	x	x	x
Catalog	x	x	x	x
Authentication	x	x	x	x
Administration	x	x	x	x
Cloud Maturity model	x	x	x	x
Provisioning	x	x	x	x
Tenant Management				
Service Detail Design				

2.0.4.3 Service Manager

Functionality	Create	Read	Undo	Delete
Monitoring				
Costs				



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Functionality	Create	Read	Undo	Delete
Inventory				
Security				
Dashboard				
Catalog				
Authentication	x	x	x	x
Administration				
Cloud Maturity model				
Provisioning				
Tenant Management	x	x	x	x
Service Detail Design	x	x	x	x

2.0.4.4 Viewer

Functionality	Create	Read	Undo	Delete
Monitoring	x	x		
Costs	x	x		
Inventory	x	x		
Security		x		
Dashboard		x		
Catalog		x		
Authentication				
Administration				
Cloud Maturity model		x		
Provisioning				



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Functionality	Create	Read	Undo	Delete
Tenant Management				
Service Detail Design				

2.0.4.5 Authorized

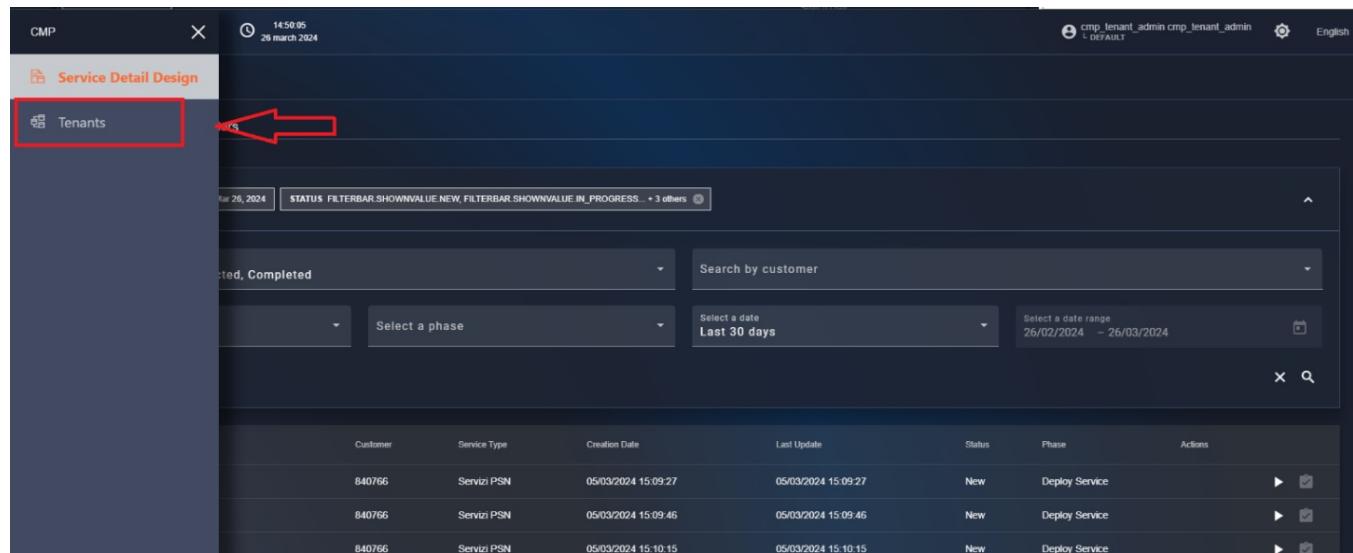
Functionality	Create	Read	Undo	Delete
Monitoring	x	x	x	x
Costs	x	x	x	x
Inventory	x	x	x	x
Security				
Dashboard	x	x	x	x
Catalog	x	x	x	x
Authentication				
Administration	x	x	x	x
Cloud Maturity model				
Provisioning	x	x	x	x
Tenant Management				
Service Detail Design				

Tenants

SCMP has been developed as a Multi-Tenant solution, which offers greater security, customization, flexibility, and scalability, with more efficient administration and reduced costs.

To allow the user to manage the tenants present in the infrastructure, the "Tenant" functionality has been made available, a feature not available to everyone but only to users enabled for Service Management.

To access the functionality, click on the bento button in the top left. Afterwards, click on "Tenant".



The screenshot shows the SCMP interface with a dark blue header bar. In the top-left corner of the main content area, there is a red box highlighting a button labeled 'Tenants'. An arrow points from this button towards the center of the screen, indicating the path to click. The interface includes various filters and search fields at the top, and a table below displaying tenant information. The table columns include Customer, Service Type, Creation Date, Last Update, Status, Phase, and Actions. There are three entries in the table, each with a 'Deploy Service' action button and a checkmark icon.

Customer	Service Type	Creation Date	Last Update	Status	Phase	Actions
840766	Servizi PSN	05/03/2024 15:09:27	05/03/2024 15:09:27	New	Deploy Service	
840766	Servizi PSN	05/03/2024 15:09:46	05/03/2024 15:09:46	New	Deploy Service	
840766	Servizi PSN	05/03/2024 15:10:15	05/03/2024 15:10:15	New	Deploy Service	

Figura 24 – Access to Tenant management

Creation of a new tenant

At this point, the user is inside the "Tenant" tab page, which contains the list of tenants configured on the system. To add a new tenant, click the "menu" available in the top right and select the "+ Add" item.



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The screenshot shows a dark-themed web interface for managing tenants. At the top, there's a header with the LEONARDO logo and some status information. Below it, a navigation bar has 'Tenants' selected. The main area is titled 'Tenants List' and displays a table with one row of data. The columns are 'Tenant ID', 'Name', and 'Description'. The data row contains 'test', 'Tenant1', and 'edited'. To the right of the table is an 'Add' button, which is highlighted with a red box and a red arrow pointing towards it.

Figura 25 – Add new tenant

Once pressed, the new tenant configuration page is displayed, divided into three sections:

The screenshot shows the 'Create tenant' form. It is divided into three main sections: A (top), B (middle), and C (bottom).
Section A (highlighted with a yellow box) contains fields for 'Tenant ID *', 'Tenant Name *', 'Description *', and 'Marketplace Subscription ID (optional)'. A yellow arrow points to this section.
Section B (highlighted with a pink box) contains a 'Data persistence (in days)' section with four tabs: Inventory (730), Cost (730), Monitoring (730), and Security (730). A pink arrow points to this section.
Section C (highlighted with a red box) contains an 'Init catalog:' section with three radio button options: 'Empty catalog', 'Copy catalog from default tenant' (which is selected), and 'Copy catalog from another tenant'. Below this is a 'Items to copy:' section with a dropdown menu set to 'Providers' and several checkboxes: 'Copy CMP Catalog', 'Copy Services', 'Copy Custom Services', and 'Copy Blueprints'. A red arrow points to this section.
At the bottom right of the form are 'Cancel' and 'Add' buttons.

Figura 26 – New tenant creation form



1. General parameters:

Name	Description	Required
Tenant ID	Unique ID of the new tenant	x
Tenant Name	Name of the tenant that will be displayed to the user	x
Description	A description of the tenant	x
MarketPlace Subscription ID	the ID received from the Azure marketplace upon service subscription	

1. Data persistence:

Name	Description	Required
Inventory	Indicates the number of days for which inventory data will be retained in the collections present in the DB	x
Cost	Indicates the number of days for which cost data will be retained in the collections present in the DB	x
Monitoring	Indicates the number of days for which monitoring data will be retained in the collections present in the DB	x
Security	Indicates the number of days for which security data will be retained in the collections present in the DB	x

1. Init Catalog

In this section, you can select the catalog items that will be automatically copied to the new tenant.

The initial section (1) allows choosing only one option from:

- Empty Catalog: leave the catalog empty without copying any information.
- Copy Catalog from Default Tenant: indicates that the tenant from which to retrieve information to copy is the Default tenant.
- Copy Catalog from other Tenant: if selected, a new field containing the list of available tenants will be displayed in the section below, allowing the selection of the tenant from which to retrieve information to copy.

Subsequently, you can fill in the next section (2) by entering the non-mandatory fields:

- **Providers:** list of providers configured in the source tenant; selecting one or more providers will copy their catalog items to the new tenant.
- **Copy SCMP Catalog:** if activated, all elements present in the SCMP catalog will be added to the new tenant.
- **Copy Services:** if activated, all elements present in the SCMP catalog will be added to the new tenant.

- **Copy Custom Services:** if activated, custom services available on the tenant will be added to the new tenant.
- **Copy Blueprints:** if activated, all available Blueprints will be added to the new tenant.
- Association Catalog

In this section, you can select the flag to enable the tenant to use the "Common" price lists analyzed later. By selecting this field, it will no longer be necessary to define a specific catalog for the tenant; it will inherit the common price lists.

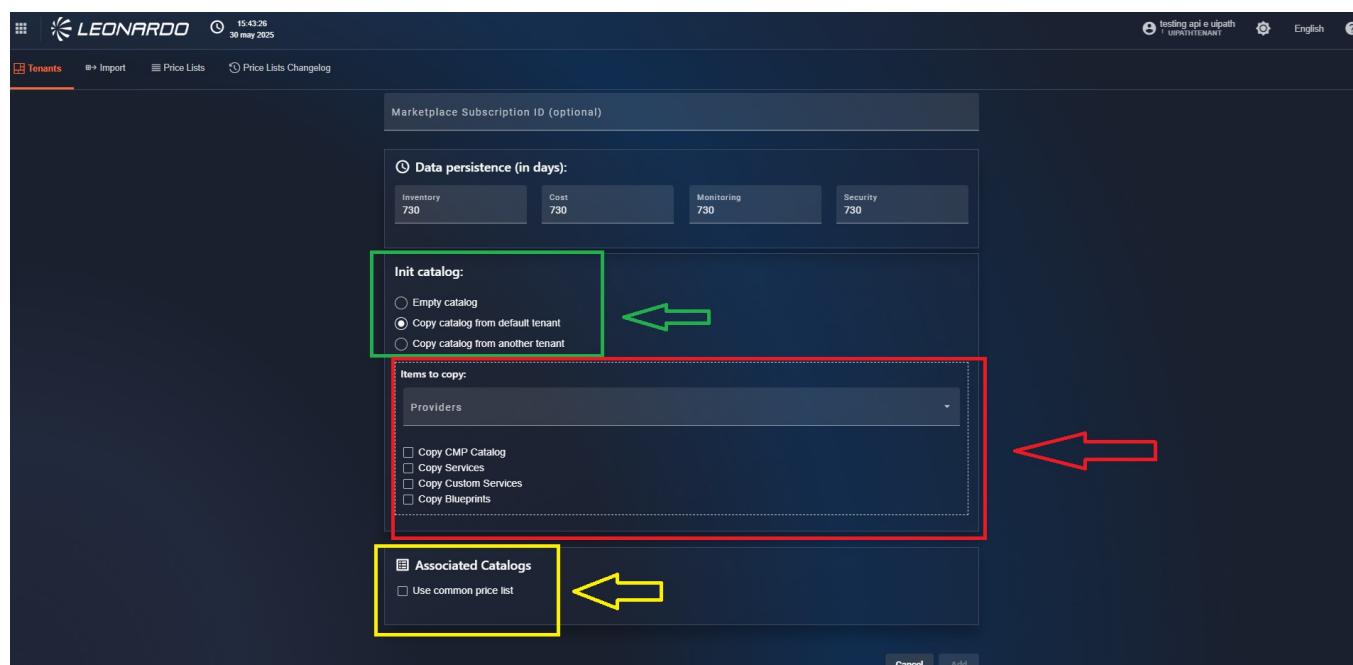


Figura 27 – Catalog initialization section

To confirm the creation of the new tenant, click the "Save" button in the bottom right. After waiting for loading, a creation confirmation message will be displayed, and the user will be returned to the tenant list where the newly created tenant will be present.

Viewing, Modifying, and Deleting a tenant

In the tenant list, next to each result, there is a "menu" with three buttons:

- "Show": allows viewing tenant information (indicated with a red arrow in the image).
- "Edit": allows modifying basic tenant information (indicated with a yellow arrow in the image).
- "Delete": allows deleting the user after clicking "confirm" in the displayed modal (indicated with a purple arrow in the image).



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Tenant ID	Name	Description
Tenant1	Tenant1	Tenant1
UniPath Tenant	UniPath Tenant edited	edited
test	test	test

Figura 28 – Control buttons

Automated tenant and subsystem creation

The user is given the possibility to automate the import of tenants and subsystems to speed up "onboarding" operations. To access the functionality, click the "import" tab available at the top of the "Tenants" functionality.



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The screenshot shows a dark-themed web application interface. At the top, there's a header with the Leonardo logo, the date '08 aprile 2025', and some user information. Below the header, the main navigation bar has 'Tenants' and 'Import' buttons. A red arrow points from the 'Import' button in the header to the 'Import' link in the breadcrumb 'Tenants / Import'. The main content area is titled 'Import Tenants and/or Subsystems' with a subtitle explaining it speeds up tenant insertion via Excel files. It has tabs for 'Tenants' and 'Subsystems' and a 'Results' button. Section 1, 'Upload import file', includes a button to 'Click here to upload a file'. Section 2, 'Configure parameters', contains a radio button for 'Data persistence (in days)' with four sub-options: Inventory (730), Cost (730), Monitoring (730), and Security (730). Below this is a section for 'Init catalog' with three radio button options: 'Empty catalog' (selected), 'Copy catalog from default tenant', and 'Copy catalog from another tenant'.

Figura 29 – Tenant import functionality

In the center of the page, there is a contextual menu that allows selecting the import type (Tenant or subsystems).

Let's analyze the 2 pages in detail.

Tenant Import

The functionality consists of 2 sections:

1. The "upload file" section where you can insert a file in .xlsx format (of which an example can be downloaded using the dedicated button) {in red in the figure}
2. The "configuration" section where it is possible to select the parameters shared between tenants (in yellow in the figure), as described in the section (Creation of a new tenant).

Once all information has been entered, you can click the "import" button (in green in the figure) to validate the uploaded file and start the import process.



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Figura 30 – Tenant configuration parameters

After a few minutes, you can use the "Results" button (in pink in the image) to view the details of the operations performed by the SCMP.

Total	Error
3	2
Run list	
Span ID	
83f62b819fd57041	Start time
c857c61a61a227bd6	2025-04-08 17:03:05
c8a8ff65d472aad8	2025-04-08 17:06:55
Name	
IMPORT - SYSTEMS	monitoringMessage
IMPORT - SYSTEMS	status
IMPORT - SYSTEMS	Duration
IMPORT - SYSTEMS	IMPORT NOT STARTED - Authorization failed for system error
IMPORT - SYSTEMS	2.35 mins
IMPORT - SYSTEMS	IMPORT NOT STARTED - Authorization failed for system error
IMPORT - SYSTEMS	2.52 mins
IMPORT - SYSTEMS	Import completed. Successfully imported 100/100 systems.
IMPORT - SYSTEMS	ok
IMPORT - SYSTEMS	1.92 mins



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Figura 31 – Results of performed imports

Subsystem Import

To access the subsystem import functionality, you need to click on the "subsystems" tab available on the "import" page.

The screenshot shows the Leonardo Secure Cloud Management Platform's import interface. At the top, there are tabs for 'Tenants' and 'Import'. The 'Import' tab is selected and highlighted with a red box. Below the tabs, there is a sub-tab 'Subsystems' which is also highlighted with a red box and has an arrow pointing to it from the left. The main area is titled 'Import Tenants and/or Subsystems' and contains instructions: 'This page allows you to speed up the insertion of tenants and subsystems by importing data through Excel files.' There are two main sections: '1. Upload import file' (with a 'Click here to upload a file' button) and '2. Select subsystems provider' (with a dropdown menu showing 'Provider' and 'VCloudDirector'). At the bottom right, there are 'Reset' and 'Import' buttons.

Figura 32 – Subsystem import functionality

The functionality consists of 2 sections:

1. The "upload file" section where you can insert a file in .xlsx format (of which an example can be downloaded using the dedicated button).
2. The selection of the provider type to import.

Once files are inserted and it's verified that the provider is compatible, you can click the "import" button (in green in the figure) to validate the uploaded file and start the import process.



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Figura 33 – Tenant and subsystem import functionality

After a few minutes, you can use the "Results" button (in pink in the image) to view the details of the operations performed by the SCMP.

Span ID	Start time	Name	monitoringMessage	status	Duration
83f62b819fd57041	2025-04-08 17:11:47	IMPORT - SYSTEMS	IMPORT NOT STARTED - Authorization failed for system error		2.35 mins
c6a8ff65d472aad8	2025-04-08 17:06:55	IMPORT - SYSTEMS	IMPORT NOT STARTED - Authorization failed for system error		2.52 mins
c657c61a61a227bd6	2025-04-08 17:03:05	IMPORT - SYSTEMS	Import completed. Successfully imported 100/100 systems.	ok	1.92 mins



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Figura 34 – Results of performed imports

"Common" Catalogs

The user is given the possibility to import a series of catalogs for SKUs or resources, which will then be used by all tenants that have the enabled flag.

To proceed with price list entry, you can access the "Price list" page available on the tenant administration module.

The screenshot shows the Leonardo Tenant Administration interface. At the top, there's a header with the Leonardo logo, a timestamp (15:54:33, 30 may 2025), and a user session indicator (testing api e uppath). Below the header, the main navigation bar includes 'Tenants', 'Import', and 'Price Lists'. The 'Price Lists' item is highlighted with a red box and has a red arrow pointing to it from the explanatory text above. The main content area is titled 'Tenants / Price Lists' and contains three filter dropdowns: 'Tenant' (set to 'Common to all tenants'), 'Provider' (with a note 'This field is required.'), and 'Year' (set to '2025'). A message at the bottom of the content area says 'Enter the required filters to view the price lists.'

Figura 35 – Access to catalog import

Once inside the page, to view the data, we can use the "Provider" filter to select the type of provider for which to check the status of price lists.



Price List	Start Date	End Date	Actions
Listino Azure con Metriche - 20250109_OnDemand_aprile-middle.xlsx	01/11/2024	30/11/2024	⋮
Listino Azure con Metriche - 20250109_OnDemand_aprile.xlsx	01/12/2024	31/01/2025	⋮
Listino Azure con Metriche - 20250109_OnDemand_maggio.xlsx	01/02/2025	31/03/2025	⋮
Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	30/04/2025	⋮

Figura 36 – Filter by provider

We can use the other filters on the page to:

- View data for a specific year ("Date" filter)
- View specific catalogs for the selected tenant ("tenant" filter)

To view the data, it is necessary to select only one type of provider, in order to display the calendar and the list of price lists applied for a given year to the specified tenant and/or common.

Inside the page, you will find the list of imported price lists with their validity period. For each row, a color is also indicated; this color helps identify the price list in the graphic section on the left. This calendar facilitates the identification of periods not covered by the price list.

The list of "inactive" price lists that have been previously replaced is also displayed.



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Current Price Lists:											
Price List	Start Date	End Date	Actions								
Listino Azure con Metriche - 20250109_OnDemand_aprile-middle.xlsx	01/11/2024	30/11/2024	⋮								
Listino Azure con Metriche - 20250109_OnDemand_aprile.xlsx	01/12/2024	31/01/2025	⋮								
Listino Azure con Metriche - 20250109_OnDemand_maggio.xlsx	01/02/2025	31/03/2025	⋮								
Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	15/07/2025	⋮								
Listino Azure con Metriche - 20250408 complessivo tot (1).xlsx	01/08/2025	31/08/2025	⋮								

Inactive Price Lists:											
Price List	Actions										
az edit 1.xlsx	⋮										

Figura 37 – Inactive price lists

New price list entry

To enter a new price list, you need to click the "hamburger menu" available in the top right of the catalog resources page and select "Import Catalogue".

Current Price Lists:											
Price List	Start Date	End Date	Actions								
Listino Azure con Metriche - 20250109_OnDemand_aprile-middle.xlsx	01/11/2024	30/11/2024	⋮								
Listino Azure con Metriche - 20250109_OnDemand_aprile.xlsx	01/12/2024	31/01/2025	⋮								
Listino Azure con Metriche - 20250109_OnDemand_maggio.xlsx	01/02/2025	31/03/2025	⋮								
Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	15/07/2025	⋮								
Listino Azure con Metriche - 20250408 complessivo tot (1).xlsx	01/08/2025	31/08/2025	⋮								

Figura 38 – Access to "Scheduled Catalog Import"

Three parameters are present in the modal:

- Tenant: select the tenant on which to perform the upload.
- Provider: Select the provider related to the price list to be entered.
- Valid From: it is possible to indicate a start date for the price list's validity. On the day indicated in this variable, the system will automatically update the catalog resources to match the new price list.

If necessary, the user can enter a "common to all tenants" price list which will be used by all configured tenants containing systems from the reference provider.

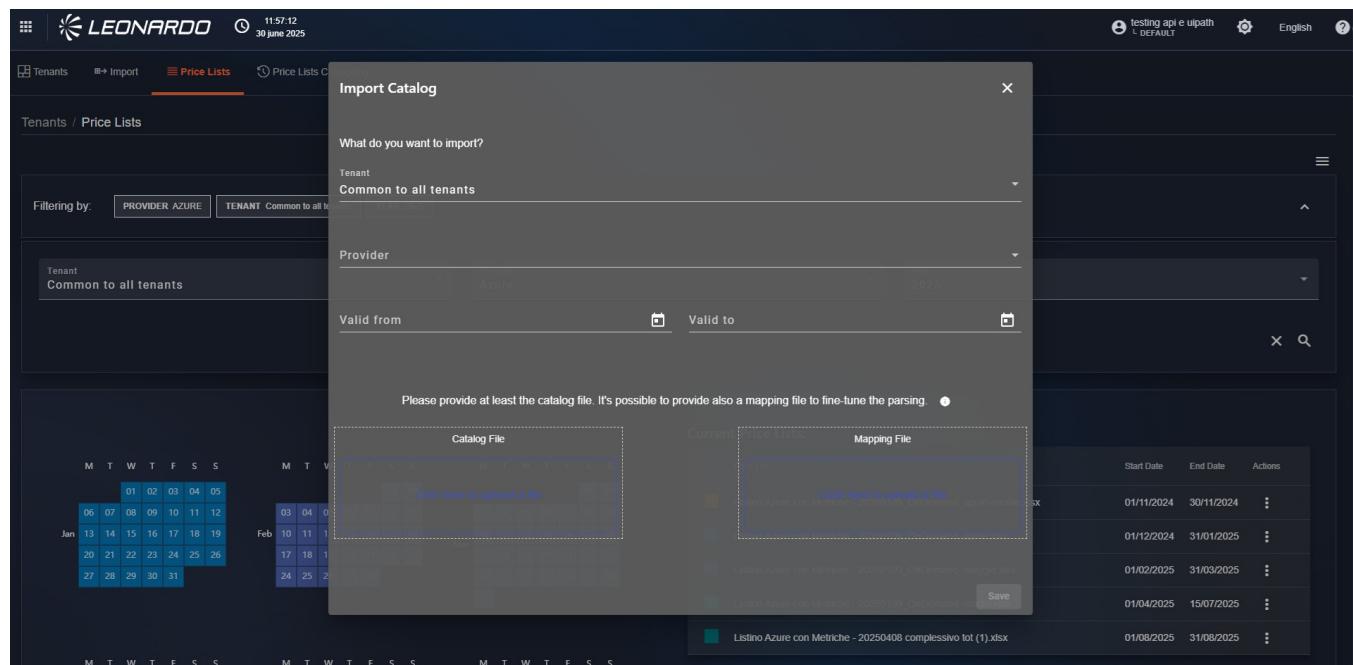


Figura 39 – Required fields for import

Additionally, below the parameters, there are two sections for file upload. By clicking on the first square on the left, you can select an "XLS" file containing all resources to be mapped. By clicking on the second square, you can insert a mapping file, following the information shown in the "Help" section indicated by a "Question Mark" icon. Clicking on it will open a box below the upload sections that contains all information related to the mapping file to be inserted.



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The screenshot shows a dark-themed web interface for managing catalog resources. On the left, a sidebar lists 'Catalog / CMP' and 'Catalog resources (12)'. The main area displays a table with columns: Price List Code, Name, and several others. A modal window titled 'Import Catalog' is open, prompting for 'Catalog File' and 'Mapping File' uploads. It includes a note about the required columns in the mapping file (name, providerCode, description, price, unit, serviceName) and an example entry: 'unit;Unità di Misura'. At the bottom right of the modal is a 'Save' button.

Figura 40 – Help message for Mapping file

After entering all parameters, you can click the save button at the bottom, and you will be returned to the previous page which, after the import, will display the new price list.

Modifying validity and deleting price lists

To modify a price list, it is necessary to click the menu corresponding to the table row containing the price list, as indicated in the figure. Subsequently, select the edit item to display the modification mask.



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Price List	Start Date	End Date	Actions
Listino Azure con Metriche - 20250109_OnDemand_aprile-middle.xlsx	01/11/2024	30/11/2024	Edit
Listino Azure con Metriche - 20250109_OnDemand_aprile.xlsx	01/12/2024	31/01/2025	Edit
Listino Azure con Metriche - 20250109_OnDemand_maggio.xlsx	01/02/2025	31/03/2025	Edit
Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	15/07/2025	Edit
Listino Azure con Metriche - 20250408_complessivo_tot (1).xlsx	01/08/2025	31/08/2025	Edit

Figura 41 – Edit a price list

Within the window, it is possible to modify the validity date of the price list, either to reduce or extend its duration. If the "Indefinite time" option is selected, the price list will remain valid until a new price list is entered. At that point, the price list with indefinite validity will be automatically deactivated and considered valid until the day the new price list is activated.

After the update, it is necessary to refresh the costs on the involved tenants, in order to correctly calculate the customer price based on the updated price lists.



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Price List	Start Date	End Date	Actions
50109_OnDemand_aprile-middle.xlsx	01/11/2024	30/11/2024	⋮
50109_OnDemand_aprile.xlsx	01/12/2024	31/01/2025	⋮
Listino Azure con Metriche - 20250109_OnDemand_maggio.xlsx	01/02/2025	31/03/2025	⋮
Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	15/07/2025	⋮
Listino Azure con Metriche - 20250408 complessivo tot (1).xlsx	01/08/2025	31/08/2025	⋮

Figura 42 – Edit the validity of a price list

The user is also given the option to delete a price list. In this case, the period previously covered by that price list will remain uncovered, i.e., without an associated rate.

Price List	Start Date	End Date	Actions
Listino Azure con Metriche - 20250109_OnDemand_aprile.xlsx	01/12/2024	31/01/2025	⋮
Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	15/07/2025	⋮
Listino Azure con Metriche - 20250408 complessivo tot (1).xlsx	01/08/2025	31/08/2025	⋮



Figura 43 – Price list deletion

Price list changes changelog

Using the "Price list changelog" tab available at the top of the "tenant administration" section, it is possible to view a list of operations performed on the price lists, with an indication of the dates used for import and the reference user who made the changes.

Provider	File name	Date from ↑	Date To	User	Success
AZURE	Listino Azure con Metriche - 20250109_OnDemand_aprile-middle.xlsx	01/11/2024	30/05/2025	cmp_tenant_admin	✓
AZURE	Listino Azure con Metriche - 20250109_OnDemand_aprile.xlsx	01/12/2024	30/05/2025	cmp_tenant_admin	✓
AZURE	az edit 1.xlsx	01/01/2025	28/05/2025	cmp_api_test	✓
GOOGLE	gg edit1.xlsx	01/01/2025	28/05/2025	cmp_api_test	✓
GOOGLE	gg edit1.xlsx	01/01/2025	17/06/2025	cmp_tenant_admin	✓
AZURE	Listino Azure con Metriche - 20250109_OnDemand_maggio.xlsx	01/02/2025	30/05/2025	cmp_tenant_admin	✓
AZURE	Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	30/05/2025	cmp_tenant_admin	✓
AZURE	Listino Azure con Metriche - 20250109_OnDemand_marzo.xlsx	01/04/2025	17/06/2025	cmp_tenant_admin	✓

Figura 44 – Error details

Using the filter available on the page, we can view data for only one selected tenant.

Reporting tools

The reporting functionality, specific to features, allows generating global reports of the information available for the various providers. Within the pages, the possibility will also be given to create files to facilitate information sharing.

To access the functionality, above the breadcrumb path, click on the "Reports" tab.

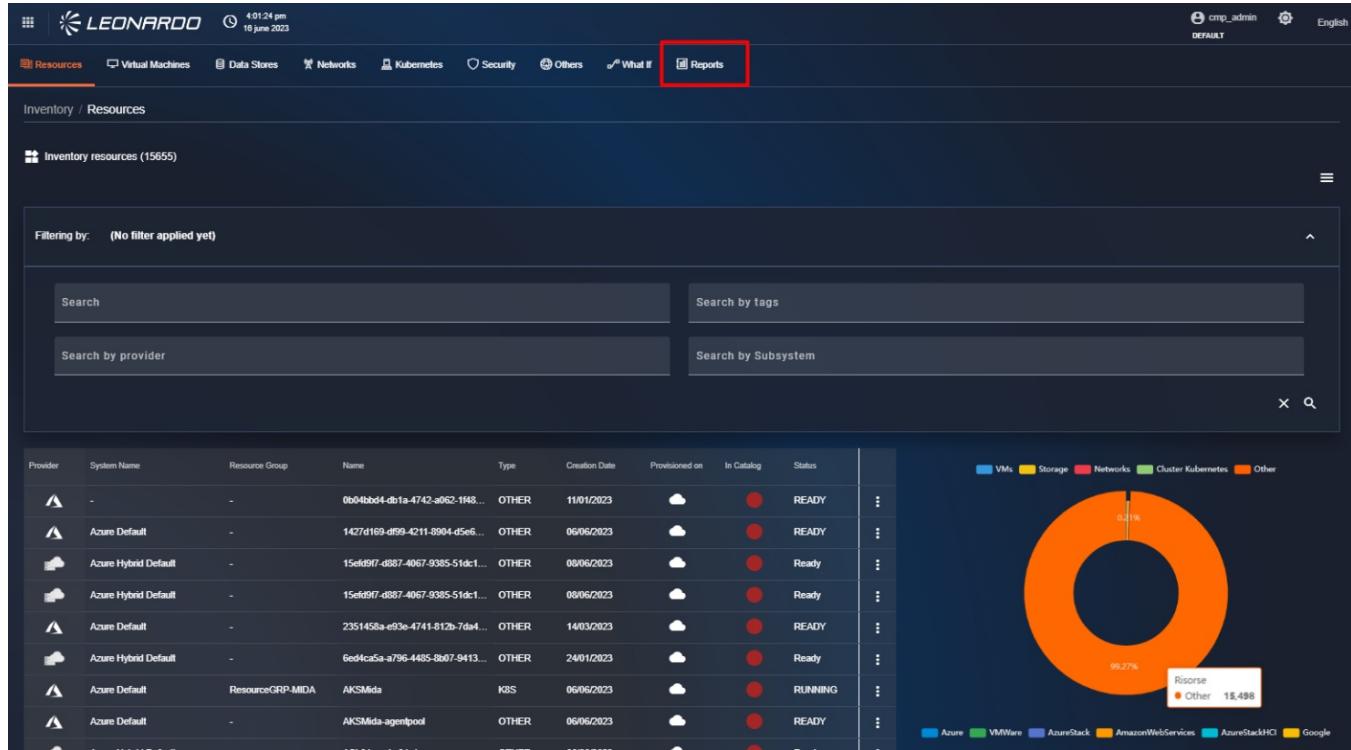


Figura 45 – Access to Catalog report

Available report types

- SKUs not in Price List** – List of SKUs that have generated costs (retrieved through the cost functionality for each provider) that are not present in the price list entered in the "price lists" section.

Report creation

In the top right of the page, we can click on the "New Report" button to start creating a report. Specifically, a modal is displayed containing the list of available report types.



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Figura 46 – New report creation

Once the report type is selected, click on the "Configure" button to select the providers to include in the report. In the newly opened window, you will find the "Provider" field that allows selecting one or more pre-existing providers in the system. Subsequently, you can select one or more subsystems to include in the report; if no providers are selected, no subsystems can be selected. Finally, there is a "tag" section to include only resources that have the entered tag.



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Figura 47 – Report configuration

To confirm the creation of a static report, verify that "One-Shot" has been selected for the "Report type" field and click the "Submit" button at the bottom.

After a loading period, the newly generated report will be visible in the list.

The screenshot shows a web-based management interface for Leonardo's Secure Cloud Management Platform. At the top, there is a header bar with the Leonardo logo, the date (12 June 2024), and various navigation links like Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is highlighted with an orange underline. Below the header, a breadcrumb navigation shows 'Inventory / Reports'. The main content area is titled 'Reports' and displays a table of generated reports. The table has columns for Sub Category, Provider, Creation Date, Status, and Actions. There are two tabs at the top of the table: 'Ready' (which is selected) and 'Scheduled'. The table lists 12 rows of data, each representing a generated report. The 'Provider' column shows values like 'AZURE, GOOGLE', 'AZURE', 'AZURE, OPENSHIFT', etc. The 'Creation Date' column shows dates ranging from 05/06/2024 to 12/06/2024. The 'Status' column is consistently 'READY'. The 'Actions' column contains three vertical ellipsis icons for each row. A 'New report' button is located in the top right corner of the table area.

Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 1:21 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	06/06/2024 - 12:29 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮

Figura 48 – List of generated reports

4 Administration

The Administration functionality is the starting point for using the SCMP.

The providers configured within this functionality will be used by the system to retrieve all necessary information.

Within this functionality, it will be possible to:

- Configure cloud providers that can be used in the reference Tenant.
- Configure folders for various providers.
- Configure cloud SIEMs for various providers.
- Configure KeyVaults for various providers.
- Configure CommVaults for Backup and Disaster & Recovery for various providers.
- Configure Confidential Computing for various providers.

4.0.1 providers/subsystems

4.0.1.1 List of subsystems

To access the Administration functionality, click the bento button in the top left corner. Then, click "Administration".





Figura 49 – Access to Administration functionality

At this point, the user is on the "Cloud Systems" tab page, where general information about the subsystems can be viewed, such as the reference provider and the subsystem's creation date. It also indicates with a red checkmark if the system is On-Premise.

We can notice that the list contains "folders," which are containers for subsystems. Clicking on the "arrow" corresponding to the folder row displays the subsystems within it and their information.

Name	Type	Creation Date	On-Premises	Status
CMP Managed Folder	GOOGLE	16/12/2024 10:47:16	<input type="checkbox"/>	●
CMP Managed Azure Folder	AZURE	16/12/2024 10:48:00	<input type="checkbox"/>	●
MAE Digital Transformation	AZURE	16/12/2024 10:48:01	<input type="checkbox"/>	●
MAE CMP	AZURE	16/12/2024 10:48:02	<input type="checkbox"/>	●
MAE OSP 2030	AZURE	16/12/2024 10:48:02	<input type="checkbox"/>	●
MAE LAB	AZURE	16/12/2024 10:48:03	<input type="checkbox"/>	●
CMP-DEV3 CLUSTER	KUBERNETES	16/12/2024 11:03:34	<input type="checkbox"/>	●
Cluster 02	OPENSHIFT	16/12/2024 11:10:56	<input type="checkbox"/>	●
VMware VMWareCMP	VMWARE	16/12/2024 11:11:39	<input checked="" type="checkbox"/>	■
SA CMP	REDHATEDGE	16/12/2024 13:00:37	<input checked="" type="checkbox"/>	■

Figura 50 – List of subsystems and folders

Additionally, each subsystem has a status, represented by a colored "LED":

- Green: the subsystem functions correctly in the SCMP "status: ok".
- Red: the subsystem is no longer usable by the SCMP "status: failed".

The SCMP periodically performs connection tests on all configured subsystems. When a subsystem fails this check, its status is updated, and all information retrieval processes (costs, inventory, monitoring, security) are disabled.

This might happen, for example, when the secret or passwords used for connection expire and need to be renewed. By modifying the subsystem, it is possible to insert new connection parameters to re-establish its correct functioning, which will be confirmed by an "OK" status.



4.0.1.1.1 INFORMATION ON SUBSYSTEM CRON-JOBS

Each tenant performs various information retrieval operations for all configured subsystems throughout the day, allowing the user to view all necessary data using only the SCMP.

To view the outcome of these operations, click on the subsystem row and, within the modal, select the "Show discovery info" button.

In addition to the number of operations and their outcome, scrolling down reveals the list and relevant details by clicking the "arrow" next to the operation of interest.

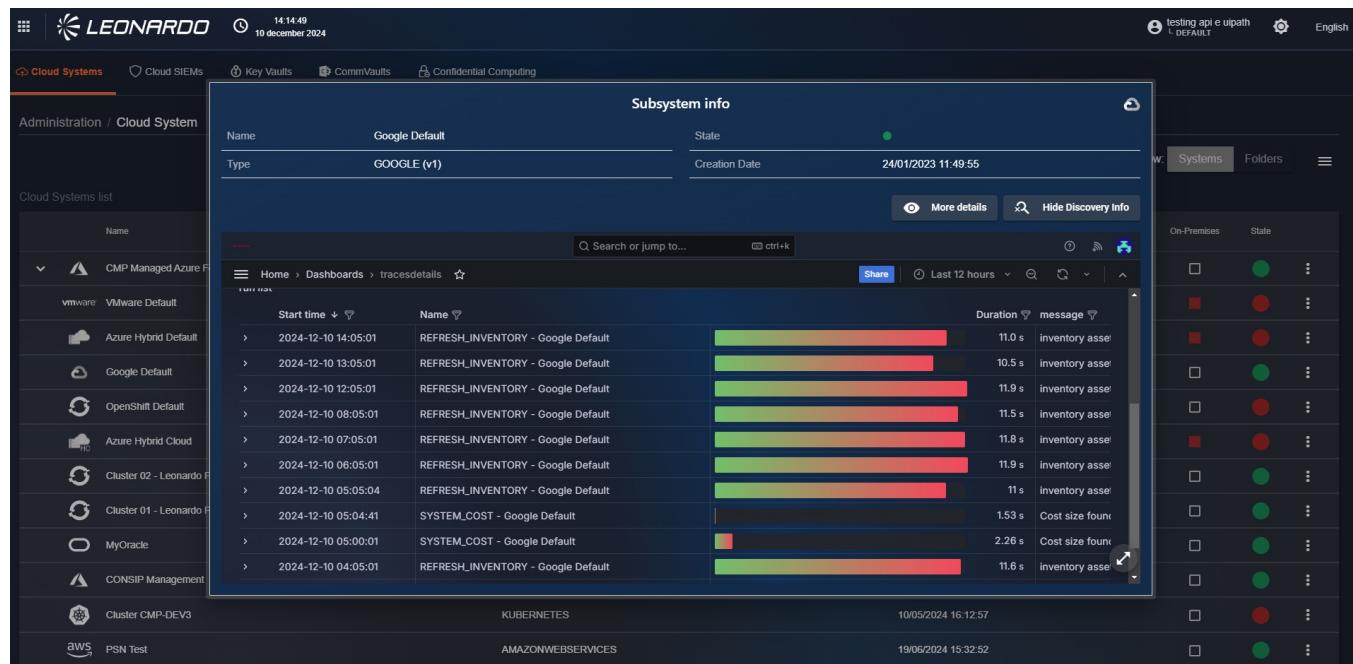


Figura 51 – Information on cron-jobs

4.0.1.1.2 VIEWING, MODIFYING, AND DELETING A SUBSYSTEM

To view the data of a Cloud Provider, within the list, click on the kebab menu corresponding to the Cloud Provider of interest and click "Show".



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Name	Type	UUID	Creation Date	Actions
azure CMP	Azure	0a09e549-dd39-4249-88e1-f2b216c25def	14/06/2022 10:00:00	⋮
Azure Default	Azure	42b246e2-779c-400e-bcbf-e4a23f438f0a	14/06/2022 10:00:00	⋮
Azure X2030	Azure	cc07be63-9b09-4343-a511-1d55d3fd0066	14/06/2022 10:00:00	⋮
Google Basic	Google	4ddb2191-043c-416f-b681-dca631d28d9e	14/06/2022 10:00:00	⋮
VMWare Default	VMWare	314e832-7894-4690-976d-b13db9d3c7d	14/06/2022 10:00:00	⋮
Azure Stack Basic	AzureStack	877fe922-f484-48d7-b7d3-4fa83de97926	22/06/2022 15:37:04	⋮
Azure Stack HCI Default	AzureStackHCI	ec8edad9-c817-405d-9491-d7eeb1d3b610	08/07/2022 12:33:19	⋮

Figura 52 – Access to Cloud Provider in view mode

On this page, you can view the Provider's configuration.

Cloud Systems Cloud SIEMs Secrets Managers

Administration / Cloud System / Show

Show Cloud Provider VMware Default

Configuration data

Cloud Provider's Name *
VMware Default

Type *
VMWare

Version *
7.0.0

Cloud Provider's ID
63b589b8f29c7a45f459bca1

Cloud Provider's UUID
57c6c237-d17d-4653-8852-e0b85e701a3e

Connection Parameters

Username *
Admin@vsphere.local
Type here your username

Password *
Type here your password

Figura 53 – Subsystem in view mode



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If the provider is "ON-PREMISE", a table showing the usable capacities on the system and the list of resources already present in the subsystem will be visible below the configuration.

Total Virtual CPU of the sub-system			
Total RAM Capacity *	64000		
Total RAM of the sub-system			
Total Storage Size Capacity *	1000		
Total storage size of the sub-system			
On-Premise System Info			
4	43484 MB		
Available vCPUs	Available RAM		
999 GB	Available Storage		
Resource Type	Resource UUID	Property	Capacity
VM	422c092a-d80c-8614-5885-6db39eed0ecc	vCPUs	2
VM	422c092a-d80c-8614-5885-6db39eed0ecc	RAM	4 MB
VM	422c2a46-740b-e700-09e0-da161763b063	vCPUs	2
VM	422c2a46-740b-e700-09e0-da161763b063	RAM	4 MB
VM	422cd039-440b-658a-cdf4-f868820ff404	vCPUs	2

Figura 54 – List of On-Premise machines

To return to the Cloud Provider page, click the "Close" button in the bottom left.

To modify the data of a Cloud Provider, within the list, click on the kebab menu corresponding to a Cloud Provider, and click "Edit".



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The screenshot shows the 'Cloud Providers' page. At the top, there's a header bar with the Leonardo logo, user information (cmp_admin, DEFAULT), and language selection (English). Below the header, the title 'Cloud Providers' is centered. Underneath, a table lists eight cloud providers with columns for Name, Type, UUID, and Creation Date. The first provider listed is 'azure CMP'. On the right side of the table, a context menu is open for the first row, containing three options: 'Show', 'Edit', and 'Delete'. A red arrow points to the 'Edit' option.

Name	Type	UUID	Creation Date	⋮
azure CMP	Azure	0a09e549-dd39-4249-88e1-f2b216c25def	14/06/2022 10:00:00	⋮
Azure Default	Azure	42b246e2-779c-400e-bcbf-e4a23f438f0a	14/06/2022 10:00:00	⋮
Azure X2030	Azure	cc07be63-9b09-4343-a511-1d55d3fd0066	14/06/2022 10:00:00	⋮
Google Basic	Google	4ddbf2191-043c-416f-b681-dca631d28d9e	14/06/2022 10:00:00	⋮
VMWare Default	VMWare	314e2832-7894-4690-976d-b13db99d3c7d	14/06/2022 10:00:00	⋮
Azure Stack Basic	AzureStack	877fe922-f484-48d7-b7d3-4fa83de97926	22/06/2022 15:37:04	⋮
Azure Stack HCI Default	AzureStackHCI	ec8edad9-c817-405d-9491-d7eeb1d3b610	08/07/2022 12:33:19	⋮

Figura 55 – Access to Cloud Provider in edit mode

After doing so, the user will be on the Cloud Provider page in "edit" mode, which allows data modification.

To return to the Cloud Provider page, click the "Save" button in the bottom left. At this point, the user will be on the Cloud Provider page.



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The screenshot shows the 'Cloud Providers' list page. A table lists various cloud providers with columns for Name, Type, UUID, and Creation Date. In the bottom right corner of the table, there is a kebab menu with three options: 'Show', 'Edit', and 'Delete'. A red arrow points to the 'Delete' option.

Name	Type	UUID	Creation Date
azure CMP	Azure	0a08e549-dd39-4249-88e1-f2b216c25def	14/06/2022 10:00:00
Azure Default	Azure	42b246e2-779c-400e-bcbf-e4a23f438f0a	14/06/2022 10:00:00
Azure X2030	Azure	cc07be63-9b09-4343-a511-1d55d3fd0066	14/06/2022 10:00:00
Google Basic	Google	4ddb2191-043c-416f-b681-dca631d28d9e	14/06/2022 10:00:00
VMWare Default	VMWare	314e832-7894-4690-976d-b13db9d3c7d	14/06/2022 10:00:00
Azure Stack Basic	AzureStack	877fe922-f484-48d7-b7d3-4fa83de97926	22/06/2022 15:37:04
Azure Stack HCI Default	AzureStackHCI	ec8edad9-c817-405d-9491-d7eebf3b610	08/07/2022 12:33:19

Figura 56 – Initiating the deletion of a Cloud Provider

To delete a Cloud Provider, within the list, click on the kebab menu corresponding to a Cloud Provider, and click "Delete".

The screenshot shows the 'Cloud Providers' list page with a confirmation dialog box overlaid. The dialog is titled 'Remove resource' and asks 'Do you really want to delete the system Azure Stack HCI Default?'. It has two buttons: 'Cancel' and 'Remove'. The 'Remove' button is highlighted with a red box and a red arrow pointing to it.

Figura 57 – Confirm Cloud Provider deletion

After doing so, a modal will appear where you need to click the "Remove" button.

At this point, the Cloud Provider will no longer be present in the list, and the asset removal flow will be launched on the resource-manager.

4.0.1.1.3 COST MODEL FOR "ON-PREMISE" PROVIDERS

To manage resource usage costs for "On-Premise" providers, the ability to define a specific cost model per subsystem is provided.

The cost model allows configuring both "provider" costs (i.e., those actually incurred) and subsequently applying a discount or markup percentage to be applied to the customer.

Providers that use this functionality are:

- VMWare
- VCloud Director
- RedHat Edge
- OpenShift

To modify the model, click the "three dots" button next to a subsystem and select "Cost model".

The screenshot shows the Leonardo Secure Cloud Management Platform interface. The top navigation bar includes the Leonardo logo, user information (testing api e upath, 14 June 2024), and language selection (English). Below the navigation is a breadcrumb trail: Administration / Cloud System. The main area displays a table titled "Cloud Systems list" with columns: Name, Type, Creation Date, On-Premises, and State. The table lists various cloud systems, including Azure Folder, VMware Default, Azure On-Premise Default, Azure Hybrid Default, Google Default, OpenShift Default, Azure Hybrid Cloud, Cluster 02 - Leonardo PaaS, Cluster 01 - Leonardo PaaS, MyOracle, CONSIP Management, and Cluster CMP-DEV3. To the right of the table is a context menu for a subsystem, with the "Cost Model" option highlighted by a red box and a red arrow pointing to it.

Name	Type	Creation Date	On-Premises	State
Azure Folder	AZURE	09/04/2023 16:45:34	<input type="checkbox"/>	●
VMware Default	VMWARE	04/01/2023 15:14:16	<input type="checkbox"/>	●
Azure On-Premise Default	AZURESTACK	04/01/2023 15:36:59	<input type="checkbox"/>	●
Azure Hybrid Default	AZURESTACKHCI	04/01/2023 15:49:36	<input type="checkbox"/>	●
Google Default	GOOGLE	24/01/2023 11:49:55	<input type="checkbox"/>	●
OpenShift Default	OPENSHIFT	07/03/2023 12:27:23	<input type="checkbox"/>	●
Azure Hybrid Cloud	AZURESTACKHYBRIDCLOUD	09/06/2023 15:36:59	<input type="checkbox"/>	●
Cluster 02 - Leonardo PaaS	OPENSHIFT	16/06/2023 16:42:04	<input type="checkbox"/>	●
Cluster 01 - Leonardo PaaS	OPENSHIFT	06/07/2023 19:00:50	<input type="checkbox"/>	●
MyOracle	ORACLE	15/12/2023 10:26:25	<input type="checkbox"/>	●
CONSIP Management	AZURE	20/03/2024 01:14:18	<input type="checkbox"/>	●
Cluster CMP-DEV3	KUBERNETES	10/05/2024 16:12:57	<input type="checkbox"/>	●



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Figura 58 – Access to subsystem cost model

On the model page, we find a first generic section where it will be possible to configure the following fields:

- Currency: the reference currency to be used for the subsystem.
- Discount/Surcharge: a discount or markup percentage to be applied to customer costs.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. In the top navigation bar, there are links for Cloud Systems, Cloud SIEMs, Key Vaults, CommVaults, and Confidential Computing. On the right, there are user profile and language settings. The main content area shows a breadcrumb path: Administration / Cloud System / Modello Costi. A modal window titled 'Cost Model: VMWareCMP' is open. Inside the modal, there is a note about what a rate is and how to calculate on-premises costs. It also explains the 'Discount / Surcharge' field. A note states that only one rate can be defined per metric type. Below this, there is a form with 'Currency' set to 'Euro' and 'Discount / Surcharge' set to '0 %'. A table lists a single rate for 'Ram' with a unit of 'ram/h' and a price of '0.20 € per GB-h'. At the bottom of the modal, there are 'Reset' and 'Apply' buttons. The background of the main interface shows other navigation options like Cloud Systems, Cloud SIEMs, Key Vaults, CommVaults, and Confidential Computing.

Figura 59 – Cost model

Subsequently, clicking the "Add rate" button will open a modal where, after choosing a metric (specific to the provider) and its relative unit of measurement, the price to be applied to all elements of the subsystem will be entered. Finally, click the "Save" button to confirm the entry.



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The screenshot shows a 'Cloud Systems' interface with a 'Cloud System / Modello Costi' section. A modal window titled 'Add Rate' is open, prompting the user to define a new rate for a metric type. The modal includes fields for Description, Metric Type (set to 'Ram'), Unit (set to 'Hourly cost available RAM (GB-h)'), and Price ('0,10 € per GB-h'). Buttons at the bottom of the modal are 'Cancel', 'Save', 'Reset', and 'Apply'.

Figura 60 – Selection of metric to price

To confirm the changes to the model after entering all costs for each available component type, click the "Apply" button at the bottom.

The screenshot shows the same 'Cloud System / Modello Costi' interface after applying the changes. The main area now displays a table of rates. The table has three columns: Metric Type, Description, and Price. It lists two entries: 'Ram' with a description '-' and a price of '0.10 € per GB-h', and 'Vcpu' with a description '-' and a price of '1.00 € per vCPU-h'. At the bottom of the table are 'Reset' and 'Apply' buttons.

Figura 61 – Complete cost model



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4.0.1.1.4 MANUAL COST UPDATE

The user is given the possibility to perform a manual cost update if needed. This asynchronous operation can be requested individually per subsystem or globally for the entire tenant, which is automatically propagated to all available subsystems.

To request an update for a single subsystem, click the "three dots" button on the subsystem row and select "Refresh Cost".

Name	Type	Creation Date	On-Premises	State
CMP Managed Azure Folder	AZURE	04/10/2024 10:12:37	<input type="checkbox"/>	●
VMware VMware Default	VMWARE	04/01/2023 15:14:16	<input checked="" type="checkbox"/>	●
Azure Hybrid Default	AZURESTACKHCI	04/01/2023 15:49:36	<input type="checkbox"/>	●
Google Google Default	GOOGLE	24/01/2023 11:49:55	<input type="checkbox"/>	●
OpenShift OpenShift Default	OPENSHIFT	07/03/2023 12:27:23	<input type="checkbox"/>	●
Azure Hybrid Cloud	AZURESTACKHYBRIDCLOUD	09/06/2023 15:36:59	<input type="checkbox"/>	●
Cluster 02 - Leonardo PaaS	OPENSHIFT	16/06/2023 16:42:04	<input type="checkbox"/>	●
Cluster 01 - Leonardo PaaS	OPENSHIFT	06/07/2023 19:00:50	<input type="checkbox"/>	●
MyOracle	ORACLE	15/12/2023 10:26:25	<input type="checkbox"/>	●
CONSiP Management	AZURE	20/03/2024 01:14:16	<input type="checkbox"/>	●
Cluster CMP-DEV3	KUBERNETES	10/05/2024 16:12:57	<input type="checkbox"/>	●
aws AWS Test	AMAZONWEBSERVICES	19/06/2024 15:32:52	<input type="checkbox"/>	●

Figura 62 – Manual cost update

Within the modal, we can specify for how many days, starting from today's date, the costs of the selected subsystem should be re-downloaded and re-confirmed. After confirmation, we can go to the "cron-job Info" section to confirm the operations.

Additionally, it is possible to request a cost update for the entire tenant: by first clicking the "hamburger menu" button available in the top left and selecting "refresh cost", the activity will be distributed across all available subsystems on the page.



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Name	Type	Creation Date	Actions
CMP Managed Azure Folder	AZURE	04/10/2024 10:12:37	[refresh]
VMware Default	VMWARE	04/01/2023 15:14:16	[refresh]
Azure Hybrid Default	AZURESTACKHCI	04/01/2023 15:49:36	[refresh]
Google Default	GOOGLE	24/01/2023 11:49:55	[refresh]
OpenShift Default	OPENSSHIFT	07/03/2023 12:27:23	[refresh]
Azure Hybrid Cloud	AZURESTACKHYBRIDCLOUD	09/06/2023 15:36:59	[refresh]
Cluster 02 - Leonardo PaaS	OPENSSHIFT	16/06/2023 16:42:04	[refresh]
Cluster 01 - Leonardo PaaS	OPENSSHIFT	06/07/2023 19:00:50	[refresh]
MyOracle	ORACLE	15/12/2023 10:26:25	[refresh]
CONSIP Management	AZURE	20/03/2024 01:14:18	[refresh]
Cluster CMP-DEV3	KUBERNETES	10/05/2024 16:12:57	[refresh]
PSN Test	AMAZONWEBSERVICES	19/06/2024 15:32:52	[refresh]

Figura 63 – Cost update for the entire tenant

Once a cost recovery is selected, it is possible to indicate the number of days to recover, and by selecting the "Reset the cost" box, the SCMP will first perform a data cleanup (for the selected range) and then perform the refresh.

Refresh Costs

Please specify the period (in number of days) for which you want to refresh the costs:

Number of days: []

Resets the costs of the indicated number of days

Cancel Refresh



Figura 64 – Cost refresh configuration

4.0.1.1.5 COST RECOVERY AND CALCULATION PROCESS

4.0.1.1.5.1 Cost recovery structure

The cost recovery process is performed by the "Abstraction Layer" module, which consists of:

- A sub-module of ABS called "layer" for each provider type (e.g., "CMP-ABS-VMWare-layer").
- ABS Gateway: this sub-module manages the communication and standardization of information retrieved from the various Layers of different providers and makes it available to other modules of the SCMP system.

The cost recovery process is performed by a cron-job, which is launched once per provider, automatically during nighttime hours.

For ON-Premise providers, usage values are automatically generated by the SCMP based on the quantity of resources available in inventory, using the same "ABS" modules. Subsequently, as with other providers, the usage values will be used to calculate costs via the cost model described in the Administration section.

In case of failure, the process is automatically scheduled up to 3 attempts. If the system fails to resolve automatically, manual intervention is required. Additionally, a manual cost update can be requested using the buttons available in the Administration section.

Below are the specific details by subsystem type.

4.0.1.1.5.2 Customer cost recovery and calculation for the Azure provider

Recovery methods:

- **"Standard" model:** The ABS module requests costs for the last 2 days via Azure's REST APIs, which are then saved in the SCMP database.
- **"Storage Account" model:** The ABS module retrieves a file containing cost extractions, divided by subsystem, which are then saved in the SCMP database.
- **"Billing storage" model:** The ABS module retrieves a file containing extractions of all subscriptions available in the "billing account"; the results are divided by subsystem and saved in the database.

Cost calculation per single resource:

1. The ABS module sends cost information and information about the resource that generated them to the cost module.
2. The cost module verifies the subsystem configuration to identify the "aggregation type". This parameter indicates which catalog to use (RESOURCES or SKUs) to correctly calculate the price.
3. The cost module checks if the resource identifier (UUID) is present in the SCMP catalog. If present, the system

multiplies the usage by the catalog cost.

4. If the resource is not present in the catalog (and therefore does not fall into the previous step), the SCMP will apply the discount/markup percentage configured in the subsystem.

4.0.1.1.5.3 Customer cost recovery and calculation for the AWS provider

- **"Standard" model:** The ABS module queries AWS Cost Explorer APIs to get costs for the last 2 days, saving the data into the SCMP database.
- **"ARN ROLE" model:** The ABS module assumes a specific IAM role (ARN ROLE) to access AWS billing data. Costs are extracted and divided by subsystem, then saved into the SCMP database.

Cost calculation per single resource:

1. The ABS module sends cost information and information about the resource that generated them to the cost module.
2. The cost module verifies the subsystem configuration to identify the "aggregation type". This parameter indicates which catalog to use (RESOURCES or SKUs) to correctly calculate the price.
3. The cost module checks if the resource identifier (UUID) is present in the SCMP catalog. If present, the system multiplies the usage by the catalog cost.
4. If the resource is not present in the catalog (and therefore does not fall into the previous step), the SCMP will apply the discount/markup percentage configured in the subsystem.

4.0.1.1.5.4 Customer cost recovery and calculation for the Google provider

- **"Standard" model:** The ABS module queries Google Cloud Billing APIs to get costs for the last 2 days, saving the data into the SCMP database.
- **"Dataset Export" model:** The ABS module accesses billing data exported from **BigQuery**. Costs are extracted, divided by subsystem, and saved into the SCMP database.

Cost calculation per single resource:

1. The ABS module sends cost information and information about the resource that generated them to the cost module.
2. The cost module verifies the subsystem configuration to identify the "aggregation type". This parameter indicates which catalog to use (RESOURCES or SKUs) to correctly calculate the price.
3. If the "Cost from USD" field has been selected, the system will use the price in USD (returned by the provider) for the calculation, to which a discount/markup percentage defined in the administration section is applied. Otherwise, the price already converted to EUR is used.
4. The cost module checks if the resource identifier (UUID) is present in the SCMP catalog. If present, the system multiplies the usage by the catalog cost.



5. If the resource is not present in the catalog (and therefore does not fall into the previous step), the SCMP will apply the discount/markup percentage configured in the subsystem.

4.0.1.1.5.5 Customer cost recovery and calculation for *Oracle*, *OracleEXAcc* providers

- **"Standard" model:** The ABS module queries ORACLE APIs to get costs for the last 2 days, saving the data into the SCMP database.

Cost calculation per single resource:

1. The ABS module sends cost information and information about the resource that generated them to the cost module.
2. The cost module verifies the subsystem configuration to identify the "aggregation type". This parameter indicates which catalog to use (RESOURCES or SKUs) to correctly calculate the price.
3. If the "Cost from USD" field has been selected, the system will use the price in USD (returned by the provider) for the calculation, to which a discount/markup percentage defined in the administration section is applied. Otherwise, the price already converted to EUR is used.
4. The cost module checks if the resource identifier (UUID) is present in the SCMP catalog. If present, the system multiplies the usage by the catalog cost.
5. If the resource is not present in the catalog (and therefore does not fall into the previous step), the SCMP will apply the discount/markup percentage configured in the subsystem.

4.0.1.1.5.6 Customer cost recovery and calculation for *Kubernetes*, *OpenShift*, *vcloudDirector*, *VMWare*, *Red Hat Edge* providers

- *Standard model:* The ABS module generates Usage data on a 24-hour basis for all resources available in the inventory, as the providers are On-premise and all resources are allocated to the customer.

Cost calculation per single resource:

1. The ABS module sends cost information and information about the resource that generated them to the cost module.
2. The SCMP will apply the discount/markup percentage configured in the cost model.

4.0.1.2 New subsystem creation

To add a new subsystem to the portal, click on the "menu" available in the top right and select "+ Add new cloud provider".



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Name	Type	Creation Date	On-Premises	
Azure Default	Azure	04/01/2023 14:57:48	<input type="checkbox"/>	⋮
VMware Default	VMWare	04/01/2023 15:14:16	<input checked="" type="checkbox"/>	⋮
OpenShift Default	OpenShift	07/03/2023 12:27:23	<input type="checkbox"/>	⋮
Azure Hybrid Default	AzureStackHCI	04/01/2023 15:49:36	<input checked="" type="checkbox"/>	⋮
AWS Default	AmazonWebServices	13/04/2023 11:05:32	<input type="checkbox"/>	⋮
google pls owner	Google	18/05/2023 14:52:32	<input type="checkbox"/>	⋮
Google Default	Google	24/01/2023 11:49:55	<input type="checkbox"/>	⋮
Azure On-Premise Default	AzureStack	04/01/2023 15:36:59	<input checked="" type="checkbox"/>	⋮
Azure Hybrid Cloud	AzureStackHybridCloud	09/06/2023 15:36:59	<input checked="" type="checkbox"/>	⋮
Cluster 02 - Leonardo PaaS	OpenShift	16/06/2023 16:42:04	<input type="checkbox"/>	⋮
azure CMP	Azure	30/06/2023 17:14:32	<input type="checkbox"/>	⋮

Figura 65 – Adding a new Cloud Provider

The user views the basic data of the subsystem to be entered, explained below.

4.0.1.2.1 PARAMETERS SHARED AMONG PROVIDERS

On the creation page, we can note 3 fields:

- Name: indicates the name that will be displayed to identify the subsystem.
- Type: indicates the type of cloud provider to which the subsystem belongs.
- Version: the version relative to the provider of the subsystem to be installed.



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The screenshot shows a web-based configuration interface for a new cloud provider. At the top, there are navigation links for 'Cloud Systems', 'Cloud SIEMs', and 'Key Vaults'. The main title is 'New Cloud Provider/Folder'. Below the title, there are three input fields: 'Cloud Provider's Name *', 'Type *', and 'Version *'. At the bottom right of the form, there are three buttons: 'Close', 'Test Connection', and 'Save'.

Figura 66 – General parameters of a subsystem

After selecting the type and version of the system, the form updates to display specific parameters based on the selected provider, as each of them manages authentication and resources differently.

All providers require authentication, which may vary by system, for asset retrieval.

This sensitive information, such as passwords or certificates, is securely saved on an infrastructural element that handles data security <https://www.vaultproject.io/>.

4.0.1.2.2 CONNECTION VERIFICATION AND SAVING, SHARED AMONG PROVIDERS

For all subsystems, 3 buttons are available at the bottom of the page:

The "Close" button allows cancelling the addition of a new subsystem.

The "Test Connection" button is used to perform a connection test using the entered parameters. In case of errors, the system returns an error message indicating "Error: Unauthorized system" and the button turns red. Otherwise, the button will turn green, and it will be possible to save the subsystem using the "Save" button.



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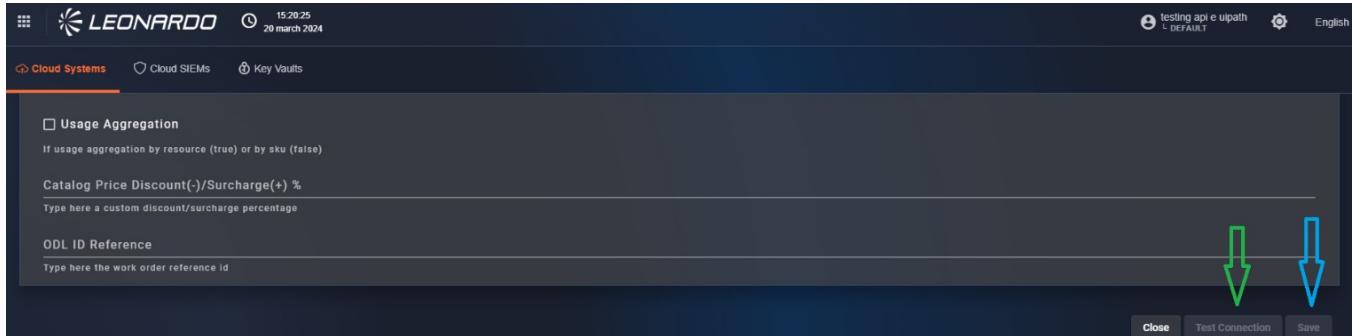


Figura 67 – Connection buttons

Upon saving, the SCMP will communicate to the module managing that provider type to load all inventory items, metrics, costs, and security elements into our bus (Kafka).

The same module will subsequently schedule jobs for the periodic update of all existing assets.

After saving, a modal will appear informing the user that a cloud provider cannot be deleted before 24 hours. From the modal, click "OK". After doing so, the user is redirected to the Cloud Provider page.

4.0.1.2.3 AMAZON WEB SERVICES PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the Amazon Web Services subsystem to be entered are shown in the table:



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The screenshot shows a configuration interface for AWS settings. The fields include:

- Access Key *
- Secret Key *
- Use a role
- Resource Aggregator Name
- Cost Bucket Path
- Cost Export Dataset ID
- Usage Aggregation
- CMP Catalog Price Discount(-)/Surcharge(+) %
- ODL ID Reference
- First Cost Recover (days)

Buttons at the bottom: Close, Test Connection, Save.

Figura 68 – Amazon Web Services configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
AccessKey *	string	The AWS access key is an alphanumeric string that identifies the AWS user.	ZYKZGVAKIS4YK5IXC AXB
SecretKey *	password	The AWS secret access key is an alphanumeric string used to authenticate the AWS user.	np6Kc_xwsvhR8Q~rP 05fCqYNXmbqfMGQL OEzfMt
use A role	Boolean	Specifies the use of one or more administration roles for authentication on one or more specific accounts within the provider's organization.	true
Arn Role (only if useArole is active)	string	Enter here the Arn ID of the role associated with a specific account for performing the monitoring discovery phase and for provisioning.	arn:aws:iam:{accountID}:role/{roleName}
Audit Arn Role (only if useArole is active)	string	Enter here the Audit Arn ID of the role associated with a specific account for performing the inventory discovery phase.	arn:aws:iam:{accountID}:role/{roleName}
Aggregator Name	string	Enter here the name of the aggregator on resources for using the AWS Config service to support the inventory discovery phase.	aws-{aggregatorName}



Name	Type	Description	Example
Cost Bucket Path	string	Enter here the path of the storage bucket for cost queries.	s3://{{bucketPath}}
Cost Export Dataset ID	string	Enter here the ID of the cost dataset on which to execute queries.	{databaseName}.{tableName}
usageAggregation	Boolean	Indicates the type of aggregation used for cost calculation (true for resources, false for SKUs).	True
Rate Code Aggregation (only if useAggregation is false)	Boolean	Indicates whether SKU aggregation occurs by SKU ID or by rate code.	true
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

■ Provider Configurations

1. S3 Configuration

- Access **Amazon S3**.
- Create or use a bucket for CUR data.
- Enable **Bucket Versioning**.

2. CUR Definition

- Access **Billing and cost management**.
- Go to the Data Exports section.
- Configure a new CUR report as follows:
 - Export details:
 - **Standard data export**: standard export format
 - **Export name**: name of the report
 - Data table content settings:
 - Select **CUR 2.0**.



- Select **Hourly** as granularity.
- Data export delivery options:
 - file format: **Parquet**.
 - file versioning: **Overwrite existing data export file**.
- Data export storage settings:
 - Configure the S3 bucket pointer with the one initially created.
 - Configure the bucket path prefix with **data**.

3. IAM Role Creation for Glue

- Access **IAM**.
- Create a custom role for Amazon Glue management.
- Assign the following policies:
 - AWSGlueServiceRole (standard AWS policy)
 - Custom policy for S3 bucket access:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": [  
                "s3:GetObject",  
                "s3:PutObject"  
            ],  
            "Resource": [  
                "arn:aws:s3:::{bucketPath}/*"  
            ]  
        }  
    ]  
}
```

4. Glue Database Creation

- Access **AWS Glue**.
- Create the database.

5. Crawler Configuration

- Create a **crawler** in Glue:
 - Select the custom role previously created.
 - Define the S3 path as `s3://{{bucketPath}}/data/`.



- Set a **scheduling** (e.g., hourly: 0 * * * *).

6. Usage in Athena

- After the first execution of the crawler, data will be available in **Athena** for queries.
- Δ *For past historical data, contact AWS support.*

1. AWS Configuration and Aggregators

a. Initial Configuration

- Access **AWS Config** and click **Get started**.
- Create an S3 bucket for aggregated data.
- Enable override for **IAM** resource types and leave the remaining default options; AWS will automatically create the necessary role.

b. Config Aggregator

- Create a **resource aggregator** in the **Aggregators** section.
- Include all regions.

1. IAM User Creation

- Access **IAM** and go to the **Users** section.
- Create a new user or select an existing one.
- Optional: enable console access for the created user.

2. Policies to Assign to the User

- AmazonAthenaFullAccess
- AmazonS3FullAccess
- AWS_ConfigRole
- AWSConfigUserAccess
- AmazonEC2ReadOnlyAccess
- CloudWatchReadOnlyAccess
- Add the following custom policy for managing the CUR bucket:



```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Sid": "VisualEditor0",  
            "Effect": "Allow",  
            "Action": [ "s3:*" ],  
            "Resource": [  
                "arn:aws:s3:::{bucketPath}/*",  
                "arn:aws:s3:::{bucketPath}/*"  
            ]  
        }  
    ]  
}
```

3. Access Key

- Generate **Secret Credential**.
- Save the **Access Key** and **Secret Key** (cannot be retrieved later). To enable **role assumption** via STS for cross-account services (e.g., AWS Config), associate the following policy with the created user:

```
{  
    "Version": "2012-10-17",  
    "Statement": [  
        {  
            "Effect": "Allow",  
            "Action": "sts:AssumeRole",  
            "Resource": [  
                "arn:aws:iam::{accountID}:role/{roleName}"  
            ]  
        }  
    ]  
}
```

4.0.1.2.4 AZURE PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval



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- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the Azure subsystem to be entered are shown in the table:

The screenshot shows a configuration interface for the Azure subsystem. It includes fields for Cloud Provider's Name (set to Azure), Version (2020-08-01), and various connection parameters like Client ID, Client Secret, Tenant ID, and Subscription ID. There are also sections for Usage Aggregation and Catalog Price Discount/Surcharge (%). The interface is part of the Leonardo Secure Cloud Management Platform.

Figura 69 – Azure configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	The unique ID of the client connecting to the Azure Cloud subsystem. This ID is used to identify the client and authorize access to the subsystem's resources.	5a85c16c6ad-49db-a58e-e209-ee11f53d6c6b
clientSecret *	password	The client's secret key, used to authenticate the client with the Azure Cloud subsystem. The secret key must be kept confidential and not shared with anyone.	np6Kc_.xwsvhR8Q-rP05fCqYNXmbqfMGQLOEfMt
tenantId *	string	The ID of the Azure tenant to which the Azure Cloud subsystem belongs. A tenant is an organizational entity in Azure representing a company or organization.	884147733-ff13-4783-a765-834183773083



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Name	Type	Description	Example
subscriptionId *	string	The ID of the Azure subscription used to access the Azure Cloud subsystem. A subscription is a contract for using Azure services.	884147733-ff13-4783-a765-834183773083
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false
Storage account ID**	String	Enter the path where cost exports are performed.	/subscriptions/{{subscription}}/resourceGroups/{{resourcegroup}}/providers/Microsoft.Storage/storageAccounts/{{storage account}}
Cost from Billing storage**	boolean	Select this checkbox to retrieve costs in "billing Account" format.	true
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15



Variables for cost calculation

Variables indicated with ** are exclusive, so only one can be selected at a time. Each variable activates a different system for cost calculation, and if more than one is set, subsystem saving will be prevented. Specifically, we can:

- Use the "Storage account ID" field to retrieve costs via automatic extractions performed individually per subsystem (only if the storage belongs to the same tenant).
- Use the "Cost from Billing storage" field to retrieve costs at the billing account level, thus using a single file for all available subscriptions (Contributor and Blob Contributor permissions are required).
- By leaving "Cost from Billing storage" and "Cost from billing storage" empty, the SCMP will retrieve costs using the Azure APIs prepared for daily costs.

This distinction is necessary to prevent Azure APIs from responding with a 429 error due to a large number of requests. Additionally, to use the methods described previously, the Azure system must be correctly configured and the entered credentials must have all necessary permissions.

4.0.1.2.5 AZURESTACK PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the AzureStack subsystem to be entered are shown in the table:



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New Cloud Provider/Folder

Configuration Data

Cloud Provider's Name *
Name *
AzureStack

Version *
2028-09-01

Connection Parameters

Client ID *
Type here the client id

Client Secret *
Type here the client secret

Tenant ID *
Type here the tenant id

Uri *
Type here the management url

ASMA Endpoint *
Type here the ASMA endpoint

SubscriptionID *
Type here the subscription id

Cost Client ID *
Type here the cost client id

Cost Client Secret *
Type here the cost client secret

Cost Tenant ID *
Type here the cost tenant id

Cost Subscriptions ID *
Type here the cost subscription id

Location *
Select the cloud system location

Total VCPU Capacity *
Total virtual CPU of the sub-system

Total RAM Capacity (MB) *
Total RAM of the sub-system, in MB

Total Storage Size Capacity (GB) *
Total storage size of the sub-system, in GB

Draining Device Percentage (D) / Overcharge (%) %
Type here a custom drainpercentage percentage

DQL ID Reference
Type here the word under reference : #

Figura 70 – AzureStack configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	The unique ID of the client connecting to the Azure Cloud subsystem. This ID is used to identify the client and authorize access to the subsystem's resources.	5a85c16c6ad-49db-a58e-e209-ee11f53d6c6b
clientSecret *	password	The client's secret key, used to authenticate the client with the Azure Cloud subsystem. The secret key must be kept confidential and not shared with anyone.	np6Kc_xwsvhR8Q~rP05fCqYNXmbqfMGQLOEzfMt
tenantId *	string	The ID of the Azure tenant to which the Azure Cloud subsystem belongs. A tenant is an organizational entity in Azure representing a company or organization.	884147733-ff13-4783-a765-834183773083
subscriptionId *	string	The ID of the Azure subscription used to access the Azure Cloud subsystem. A subscription is a contract for using Azure services.	884147733-ff13-4783-a765-834183773083
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false



Name	Type	Description	Example
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

For On-Premise providers, in particular, data on infrastructure capacity is requested so that the SCMP can perform preliminary calculations in multiple scenarios.

For example, during provisioning, to ensure that the maximum allowed capacity of the provider is not exceeded.

4.0.1.2.6 AZURESTACK HCI PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the AzureStack HCI subsystem to be entered are shown in the table:



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The screenshot shows a configuration interface for AzureStack HCI. At the top, there's a header with the Leonardo logo and some status indicators. Below the header, there are tabs for 'Cloud Systems', 'Cloud SIEMs', and 'Key Vaults'. A sidebar on the left lists sections like 'Connection Parameters', 'Bridge Machine Username', 'Bridge Machine Password', 'Bridge Machine IP Address', 'Client ID', 'Client Secret', 'Tenant ID', 'Subscription ID', 'Location', 'Total vCPU Capacity', 'Total RAM Capacity (MB)', and 'Total Storage Size Capacity (GB)'. Each section has a descriptive label and a text input field. At the bottom right of the form, there are buttons for 'Close', 'Test Connection', and 'Save'.

*Figura 71 – AzureStack HCI
configuration mask*

Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	The unique ID of the client connecting to the Azure Cloud subsystem. This ID is used to identify the client and authorize access to the subsystem's resources.	5a85c16c6ad-49db-a58e-e209-ee11f53d6cb
clientSecret *	password	The client's secret key, used to authenticate the client with the Azure Cloud subsystem. The secret key must be kept confidential and not shared with anyone.	np6Kc_.xwsvhR8Q-rP05fCqYNXmbqfMGQLOEzfMt
tenantId *	string	The ID of the Azure tenant to which the Azure Cloud subsystem belongs. A tenant is an organizational entity in Azure representing a company or organization.	884147733-ff13-4783-a765-834183773083
subscriptionId *	string	The ID of the Azure subscription used to access the Azure Cloud subsystem. A subscription is a contract for using Azure services.	884147733-ff13-4783-a765-834183773083
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false



Name	Type	Description	Example
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

For On-Premise providers, in particular, data on infrastructure capacity is requested so that the SCMP can perform preliminary calculations in multiple scenarios.

For example, during provisioning, to ensure that the maximum allowed capacity of the provider is not exceeded.

4.0.1.2.7 AZURESTACK HYBRID CLOUD PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the AzureStack Hybrid cloud subsystem to be entered are shown in the table:



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The screenshot shows a configuration interface for an AzureStack Hybrid cloud. It includes sections for Connection Parameters (Bridge Machine Username, Password, IP Address), Cluster Name, Network Controller URI, and various capacity and discount parameters. Mandatory fields are marked with an asterisk (*).

Figura 72 – AzureStack Hybrid cloud configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	The unique ID of the client connecting to the Azure Cloud subsystem. This ID is used to identify the client and authorize access to the subsystem's resources.	5a85c16c6ad-49db-a58e-e209-ee11f53d6cb
clientSecret *	password	The client's secret key, used to authenticate the client with the Azure Cloud subsystem. The secret key must be kept confidential and not shared with anyone.	np6Kc_.xwsvhR8Q~P05fCqYNXmbqfMGQLOEzfMt
tenantId *	string	The ID of the Azure tenant to which the Azure Cloud subsystem belongs. A tenant is an organizational entity in Azure representing a company or organization.	884147733-ff13-4783-a765-834183773083
subscriptionId *	string	The ID of the Azure subscription used to access the Azure Cloud subsystem. A subscription is a contract for using Azure services.	884147733-ff13-4783-a765-834183773083
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false



Name	Type	Description	Example
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

For On-Premise providers, in particular, data on infrastructure capacity is requested so that the SCMP can perform preliminary calculations in multiple scenarios.

For example, during provisioning, to ensure that the maximum allowed capacity of the provider is not exceeded.

4.0.1.2.8 REDHAT EDGE DEVICE PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the Google Cloud subsystem to be entered are shown in the table.



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The screenshot shows a dark-themed web interface for managing cloud providers. At the top, there are navigation links for Cloud Systems, Cloud SIEMs, Key Vaults, CommVaults, and Confidential Computing. The main header says "Administration / Cloud System / New". Below this, a modal window titled "New Cloud Provider/Folder" is open. It has sections for "Configuration data" and "Connection Parameters". Under Configuration data, there are fields for "Cloud Provider's Name *" (set to "Edge"), "Type *" (set to "Edge"), and "Version *" (set to "v1"). Under Connection Parameters, there are fields for "Client ID *" (placeholder "Type here the client id") and "Client Secret *" (placeholder "Type here the client secret"). At the bottom of the modal are three buttons: "Close", "Test Connection", and "Save".

Figura 73 – Edge configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
client_id *	string		10482247326 1100667392
clientSecret *	string	Client secret used for connection	82hg7ds1h0sd s7392
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	10
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

■ PROVIDER side configuration

To be able to add the system to the SCMP, some configurations need to be performed on the provider's portal.

Specifically:

- Create a service account
 - a. Access <https://console.redhat.com>
 - b. In the top right, click on the  Settings icon → Service Accounts → Create service account.
 - c. Enter Name and Description → Create.
 - d. Immediately copy the Client ID and Client Secret (the secret will not be shown again).
- Assign permissions
 - a. Go to Settings → User Access → Groups
 - b. Create a group that contains the following permissions/roles:

Service	Recommended role
Edge Management (fleet, update)	Edge Management Administrator or User
Image Builder	Image Builder Administrator or User
Insights Inventory (host read)	Insights Inventory Viewer

- In the Service accounts tab of the group → Add service account → select the newly created account.
- Rotate and revoke permissions
 - a. Portal → Service Accounts → menu (:)
 - b. Select **Reset credentials** to regenerate only the Client Secret.
 - c. Select **Delete service account** to permanently decommission the automation.

With this configuration, you can securely orchestrate the entire edge lifecycle – from image generation to update rollout – without ever using personal credentials.

4.0.1.2.9 GOOGLE CLOUD PARAMETERS

Enabled functionalities:

Catalog item retrieval

- Inventory item retrieval



- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the Google Cloud subsystem to be entered are shown in the table. The “Service account” field can be entered either automatically or manually as described in the paragraph.

Figura 74 – Google configuration mask

Parameters indicated with * are mandatory (available below the service account section).

Name	Type	Description	Example
serviceAccount *	object	Connection file generated from the Google console	service_account.json
discoveryProjectId *	string	Identifier of the project for which discovery will be performed	Theproject-547280
costExportProjectId	string	Dataset ID of the cost export service account if the dataset is different from the ProjectID	test-customer.test_customer.gcp_billing_export_resource_v1_0152 7DF_51B683_EB2A9



Name	Type	Description	Example
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false
Cost from USD Currency	boolean	Indicates whether the final cost is calculated from the price in USD or EUR.	true
providerPriceDiscount ** (only if costFromUSDCurrency is true)	integer	Enter here a discount/markup to apply to provider prices in USD for all resources.	30
catalogPriceDiscount **	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	-5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

Variables for cost calculation

The variables indicated with ** are used differently for "customer" cost calculation depending on the presence of the "Cost from USD Currency" field. Specifically:

- If the field is deactivated, the value entered in "catalogPriceDiscount" is used as a percentage added to the price retrieved from the provider (or discounted if the value is negative), as for other providers.
- If the field is activated, the value entered in "catalogPriceDiscount" and the "providerPriceDiscount" value are used as a coefficient multiplied by the cost in USD retrieved from the provider.

This distinction is necessary to prevent Azure APIs from responding with a 429 error due to a large number of requests. Additionally, to use the methods described previously, the Azure system must be correctly configured and the entered credentials must have all necessary permissions.



Figura 75 – Loading the configuration file

By uploading the file, the form is automatically completed with the necessary parameters, but it is also possible to enter them manually (yellow box in the image), following the table. All fields are mandatory:

Name	Type	Description	Example
Type	string	Enter the name of the configured authentication type.	service_account
project_id *	string	Enter here the unique ID of the project associated with the service account.	Theproject-367810
private_key_id *	string	Enter here the unique ID of the service account's private key.	55cb5cf903ee93ea1e9c294a07e46e0af0633e6
private_key *	password	Contains the service account's private key in PEM format. It is essential for authenticating the service account to Google Cloud APIs.	-----BEGIN PRIVATE KEY-----MIIJQgIBADANB...
client_e-mail *	string	The unique email address of the service account. It is used to identify the service account when authenticating to Google Cloud APIs.	user@dominio.com



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Name	Type	Description	Example
client_id *	string	The client ID of the service account. It is a unique identifier used to identify the service account in Google Cloud.	104822473261100667392
auth_uri *	string	The URI used for authenticating the service account to Google Cloud APIs.	https://accounts.google.com/o/oauth2/auth
token_uri *	string	The URI used to obtain an access token for the service account.	https://oauth2.googleapis.com/token
auth_provider_x509_cert_url*	string	The URL of the X.509 certificate used for authenticating the service account.	https://www.googleapis.com/oauth2/v1/certs
client_x509_cert_url *	string	The URL of the X.509 certificate in the client.	https://www.googleapis.com/robot/v1/metadata/f543/myserviceaccount%40projectName.gserviceaccount.com

■ Provider Configuration

1. Access GCP Console

- Go to <https://console.cloud.google.com/>
- Log in with your Google Cloud account.

2. Create or Identify the Service Account (SA)

From the console, select the project at the top where you want to add (or where it is already present) the service account. From the console, to create the service account, go to IAM and admin > Service accounts. Click on Create service account. Assign an ID (e.g., my-service-account), name, and description, then Create. On the service account page, go to the Keys section. Click on Add key and select Create new key. Choose JSON format and click Create. Download and keep the JSON file in a safe place.

3. Associate Permissions with the Service Account

On the same service accounts page, find the newly created account and click on its name. Go to the Permissions section and in the table below, next to the service account, in the Inheritance column, click on Edit principal. In the pop-up menu, select the appropriate roles for the service account. Below is the minimal list of roles for the SCMP: - App Engine Admin - BigQuery Data Transfer Service Agent - Cloud OS Config Service Agent - Compute Admin - Kubernetes Engine Service Agent - OS Inventory Viewer - Security Center Service Agent Click Save and add the permissions to the service account.

4. Enable Service APIs

Go back to the console home. Select the project at the top where the service account is present. Go to APIs and services. At the top, click on + Enable APIs and services. Search for the API services to enable in the search bar and click on their name. Once inside the API service, select Enable to activate it; below are the API services for the SCMP: - Cloud Monitoring API - Compute Engine API - Cloud Asset API - BigQuery API - Cloud Resource Manager API - OS Config API - Security Command Center API - Cloud Billing API - Service Usage API - Cloud Dataplex API

5. Cost Dataset

If the cost dataset is located in a different service account than the one you want to integrate, specify the complete connection string to the relevant dataset in the Cost Export Dataset ID text box (in the subsystem creation module present in SCMP administration) (e.g., projectId.datasetName.tableName).

4.0.1.2.10 KUBERNETES PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval



- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the Kubernetes subsystem to be entered are shown in the table.

Figura 76 – Kubernetes configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
Certificate authority data *	string	Enter the data related to the certificate used by the user for connection.	Sgeijesf90434n7u3h97ef
Kubernetes API server URI *	string	Enter the URL of the server to connect to.	https://www.google.com/infos



Name	Type	Description	Example
User certificate Data *	String	Enter the certificate related to the user used for connection.	---begin private key-- fnbsujffsfoije ...
User key Data *	String	Enter the key related to the user used for connection.	Sf8j9jts4ewht7h3wf wj908w
User token *	String	Secret token related to the user used for connection to the provider.	Sf8eufce9sfber4543 jh8ddsfh89r43
User name *	String	Enter the username used for authentication.	administrator
Label selector	string	Enter here a selector to filter resources retrieved by the SCMP.	Name=rossi
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	-10
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001

■ Provider Configuration

The standard authentication method is via the parameters contained in the kubeconfig file. The kubeconfig defines:
API server endpoint (server) Authentication method (client certificates, tokens, oidc, etc.) Default namespace
Context Authentication: Via client certificates (client-certificate-data and client-key-data)

Or via token (token in the user context)

Minimal kubeconfig example:

```
apiVersion: v1
kind: Config
clusters:
- cluster: certificate-authority-data:
  server: https://name: my-cluster
contexts:
- context:
  cluster: my-cluster
  user: my-user
  name: my-context
  current-context: my-context
users:
- name: my-user
  user:
    token:
```

4.0.1.2.11 OPENSHIFT PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval

- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the OpenShift subsystem to be entered are shown in the table:

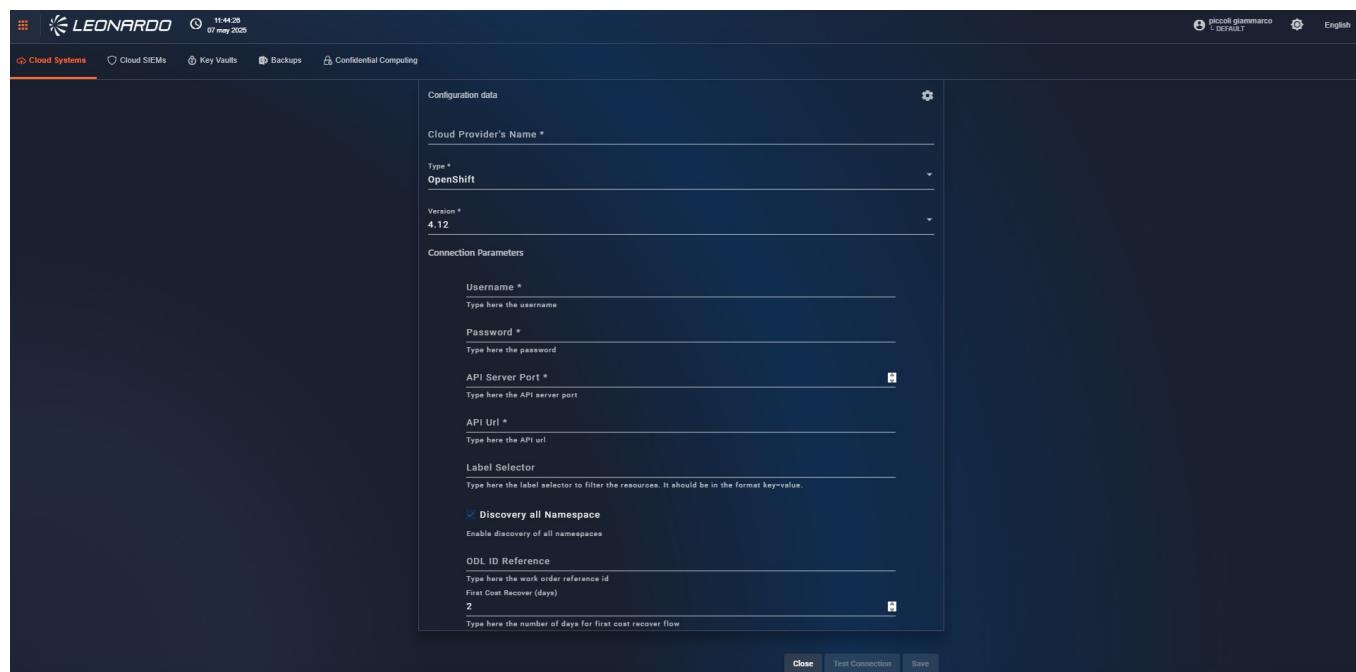


Figura 77 – OpenShift configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
Username *	string	The username of the OpenShift user that will be used for connection to the provider.	name.surname@mail.com
Password *	password	The client's password, used to authenticate the client with the subsystem. The secret key must be kept confidential and not shared with anyone.	np6KcXmbqfMGQLOEfzMt
API server port *	integer	The port on which the OpenShift APIs are listening.	8090



Name	Type	Description	Example
API url *	string	The OpenShift URL on which to make requests.	www.google.com
discover all Namespaces	boolean	If the user has administrator permissions on all OpenShift "projects," all namespaces will be retrieved.	false
Namespace selector (only visible if "discover all namespaces" is active)	selection	If the user has visibility of a limited number of namespaces, it is necessary to enter the list of enabled namespaces here.	demo.infos,production
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

User authorizations

If the "Discover all namespaces" field is selected, it is necessary that the user has administration permissions on **ALL** namespaces, otherwise, the system cannot be added.

This distinction is necessary because the OpenShift system automatically blocks incorrectly authorized requests.

Provider Configuration

To connect an OpenShift cluster system, it is sufficient to have a named or impersonal user with adequate privileges (e.g., cluster-admin or otherwise sufficient for the intended use) on the cluster.

Authentication:

Username and Password

Notes:

In OpenShift, it is very common to use specially created ServiceAccounts, with corresponding RoleBindings or ClusterRoleBindings.

Users can be both human (named) and technical (impersonal).

4.0.1.2.12 ORACLE PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Resource cost retrieval
- Security information retrieval

The specific parameters of the Oracle subsystem to be entered are shown in the table:

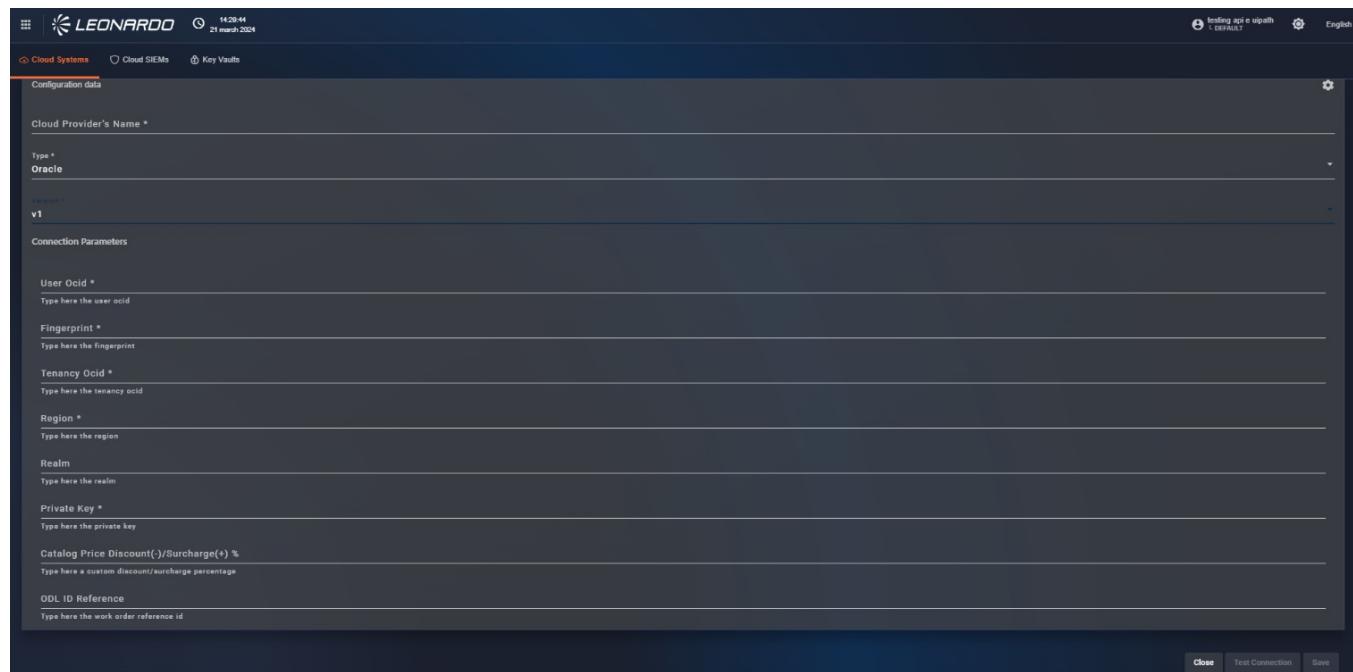


Figura 78 – Oracle configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
username *	string	The username used for authentication with OCI.	ocid5.user.oc77.aaabnbthaj6pnvbs2gqnaaaaait3mqzekefmlhwkige2wxna6hfaj3f6njma
fingerprint *	string	Is a unique value that identifies the device, used for authentication with OCI.	6a:f4:6e:9a:73:95:27:d5:64:8d11:a3:f5:0e:fb:f4:
tenantId *	string	The ID of the OCI tenant to connect to.	ocid5.tenancy.oc77...aaabnbthaj6pnvbs2gqnaaaaait3mqzekefmlhwkige2wxna6hfaj3f6njma



Name	Type	Description	Example
region *	string	The region is the specific geographic location where OCI resources are located.	eu-dcc-rome-1
Realm	string	The name of the logical container that groups OCI resources and their associated costs.	personal-realm.it
keyFile *	password	A PEM file containing the public and private key used for authentication.	" -----BEGIN PRIVATE KEY-----MII JQgIBADANB..."
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	-10
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

■ Provider Configuration

Procedure for creating parameters for external integration in Oracle Cloud Infrastructure (OCI): 1. Access OCI Console

Go to <https://cloud.oracle.com/>
Log in with your Oracle Cloud account.

1. Create or Identify the IAM User

In the main console menu, go to Identity & Security > Users. Select an existing user or create a new user for the integration: Click on Create User if you need to create one. Assign a name and an email. Save.

2. Associate the user with a group with adequate permissions

After creating the user, you must associate it with a group that has permissions for the resources you want to manage via API. Go to Identity > Groups. Select a group (e.g., Administrators or create a custom group). Click on Add User to Group and add the newly created user.

3. Generate the API key (Key File)

Go back to the user page (Identity > Users > select user). Go to the API Keys tab. Click on Add API Key. You have two options: Upload an existing public key (RSA public). Or generate a new public and private key from the console (download the private key). Select “Generate API Key Pair” to locally generate the key: Download the private key (.pem) and save it securely (it is your Key File). The public key will be automatically associated with the user.

4. Obtain the required parameters

User OCID (User OCID): Go to Identity > Users > select user. You will find the user OCID on the user page (format ocid1.user.oc1..aaaaaaaa...). Fingerprint: It is the fingerprint of the public API key you added (displayed in the API Keys section). Tenant OCID (Tenant OCID / Main Compartment OCID): Go to Identity > Tenancy (click on the tenancy name in the top left). You will find the tenancy OCID (it is the main tenant, e.g., ocid1.tenancy.oc1..aaaaaaaa...). Region: Choose your OCI region (e.g., eu-frankfurt-1, us-ashburn-1, etc.). You can find it in the top right of the console or in Governance & Administration > Regions. Realm: It is usually oc1 for most public OCI tenants. You can verify this in the documentation or via CLI if necessary.

Summary of parameters and where to find them

Parameter Where to find it / how to obtain it User OCID Identity > Users > select user > OCID Fingerprint Identity > Users > API Keys > fingerprint Tenant OCID Identity > Tenancy > OCID Region Top right of the console (e.g., eu-frankfurt-1) Realm Generally oc1 (standard OCI realm) Key File Private .pem key generated at the time of API Key creation

4.0.1.2.13 ORACLEEXACC PARAMETERS



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Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Resource cost retrieval
- Security information retrieval

The specific parameters of the OracleExAcc subsystem to be entered are shown in the table:

The screenshot shows the 'New Cloud Provider/Folder' configuration dialog. The 'Cloud Provider's Name' field is set to 'OracleExAcc'. The 'Type' dropdown shows 'OracleExAcc'. The 'Version' dropdown shows 'v1'. The 'Connection Parameters' section includes fields for 'User Ocid', 'Fingerprint', 'Tenancy Ocid', 'Region', 'Private Key', and 'ODL ID Reference'. The 'User Ocid' field contains placeholder text 'Type here the user ocid'. The 'Fingerprint' field contains placeholder text 'Type here the fingerprint'. The 'Tenancy Ocid' field contains placeholder text 'Type here the tenancy ocid'. The 'Region' field contains placeholder text 'Type here the region'. The 'Private Key' field contains placeholder text 'Type here the private key' and 'CMP Catalog Price Discount(%) / Surcharge(%)' with a value of '0'. The 'ODL ID Reference' field contains placeholder text 'Type here the work order reference id' and 'First Cost Recover (days)' with a value of '2'.

Figura 79 – OracleExAcc configuration
mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
username *	string	The username used for authentication with OCI.	ocid5.user.oc77.aaabnbthaj6pnvsb2g qnaaaaaait3mqzekefmilhwkige2wxna6h faj3f6njma
fingerprint *	string	Is a unique value that identifies the device, used for authentication with OCI.	6a:f4:6e:9a:73:95:27:d5:64:8d11:a3:f5 :0e:fb:f4:



Name	Type	Description	Example
tenantId *	string	The ID of the OCI tenant to connect to.	ocid5.tenancy.oc77...aabnbthaj6pnv sb2gqnaaaaait3mqzekefmlhwkige2wx na6hfaj3f6njma
region *	string	The region is the specific geographic location where OCI resources are located.	eu-dcc-rome-1
Private key *	password	A PEM file containing the public and private key used for authentication.	" -----BEGIN PRIVATE KEY-----MIIJQ gIBADANB..."
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	-10
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
dataFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

4.0.1.2.14 VCLOUD PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval

The specific parameters of the VCloudDirector subsystem to be entered are shown in the table.



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The screenshot shows the configuration interface for a new VCloudDirector provider. It includes fields for the provider's name, type, connection parameters (URL endpoint, tenant ID, token), and optional catalog price discount. The interface is part of a larger dashboard with navigation links for Cloud Systems, Cloud SIEMs, and Key Vaults.

Figura 80 – VCloudDirector configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
url *	string	The address of the VCloudDirector server to connect to.	https://url.westeurope.com/tenant/org-zzg-435832
tenantId *	string	The VCloudDirector tenant ID is the unique identifier of the tenant to connect to.	org-zzg-435832
Use providerPermission	boolean	To be activated if the user has all provider-level authorizations; if not activated, not all information is retrieved, only that of the enabled organizations.	true
token *	password	The authentication token for the VCloudDirector is a secret string used to authenticate the user with the VCloudDirector.	aesZo6LextKTQx92VoRpyzaesZo6LextKT
Location	String	Enter the region to which the VCloudDirector resources belong.	Eu west
Location	string	Enter the geographical location of the system.	OnPremise
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5



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Name	Type	Description	Example
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001

4.0.1.2.15 VMWARE PARAMETERS

Enabled functionalities:

- Catalog item retrieval
- Inventory item retrieval
- Usage metrics retrieval
- Resource cost retrieval
- Security information retrieval
- Resource provisioning
- Service provisioning
- Complex blueprint provisioning

The specific parameters of the VMWare subsystem to be entered are shown in the table:

*Figura 81 – VMWare configuration
mask*



Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	The unique ID of the client connecting to the Azure Cloud subsystem. This ID is used to identify the client and authorize access to the subsystem's resources.	5a85c16c6ad-49db-a58e-e209-ee11f53d6c6b
clientSecret *	password	The client's secret key, used to authenticate the client with the Azure Cloud subsystem. The secret key must be kept confidential and not shared with anyone.	np6Kc_xwsvhR8Q-rP05fCqYNXmbqfMGQLOEzfMt
tenantId *	string	The ID of the Azure tenant to which the Azure Cloud subsystem belongs. A tenant is an organizational entity in Azure representing a company or organization.	884147733-ff13-4783-a765-834183773083
subscriptionId *	string	The ID of the Azure subscription used to access the Azure Cloud subsystem. A subscription is a contract for using Azure services.	884147733-ff13-4783-a765-834183773083
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
daysFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

For On-Premise providers, in particular, data on infrastructure capacity is requested so that the SCMP can perform preliminary calculations in multiple scenarios.

For example, during provisioning, to ensure that the maximum allowed capacity of the provider is not exceeded.

4.0.1.3 Folders

4.0.1.3.1 AZURE FOLDER

To allow the SCMP to leverage all the potential offered by the "Azure" provider, the ability to configure "Folders" has been introduced.

During the creation of a provider, by selecting the "Azure" type, we can observe the presence of an exclusive field for the provider:



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- A confirmation box to indicate to the SCMP if the provider being added is a "Folder".

The screenshot shows the 'New Cloud Provider / Folder' configuration page. The 'Cloud Provider's Name' is set to 'Azure'. The 'Is a Folder of projects' checkbox is checked and highlighted with a red box. An arrow points from the text above to this checkbox. Other fields include 'Version' (2020-08-01), 'Client ID', 'Client Secret', 'Tenant ID', and 'Usage Aggregation' (unchecked). The 'Connection Parameters' section is also visible.

Figura 82 – Azure folder option

The specific parameters of the Azure subsystem to be entered are shown in the following table:

The screenshot shows the 'Azure Folder configuration' dialog box. It includes fields for 'Client ID', 'Client Secret', 'Tenant ID', 'Usage Aggregation' (unchecked), 'Catalog Price Discount(-)/Surcharge(+) %', 'ODL ID Reference', and 'Days first cost recover' (set to 2). At the bottom are 'Close', 'Test Connection', and 'Save' buttons.

Figura 83 – Azure Folder configuration



mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	The unique ID of the client connecting to the Azure Cloud subsystem. This ID is used to identify the client and authorize access to the subsystem's resources.	5a85c16c6ad-49db-a58e-e209-ee11f53d6c6b
clientSecret *	password	The client's secret key, used to authenticate the client with the Azure Cloud subsystem. The secret key must be kept confidential and not shared with anyone.	np6Kc_.xwsvhR8Q~P05fCqYNXmbqfMGQLOEzfMt
tenantId *	string	The ID of the Azure tenant to which the Azure Cloud subsystem belongs. A tenant is an organizational entity in Azure representing a company or organization.	884147733-ff13-4783-a765-834183773083
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	5
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
daysFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

4.0.1.3.2 GOOGLE CLOUD FOLDERS

To allow the SCMP to leverage all the potential offered by the "Google Cloud" provider, the ability to configure "Folders" has been introduced, along with the option to import the file generated from the provider's console to simplify its insertion.

During the creation of a provider, by selecting the "Google Cloud" type, we can observe the presence of 2 exclusive fields for the provider:

1. A confirmation box to indicate to the SCMP if the provider being added is a "Folder".
2. A box where, by clicking inside, it will be possible, through the Windows file selection window, to insert the "JSON" file exported directly from the Google console.

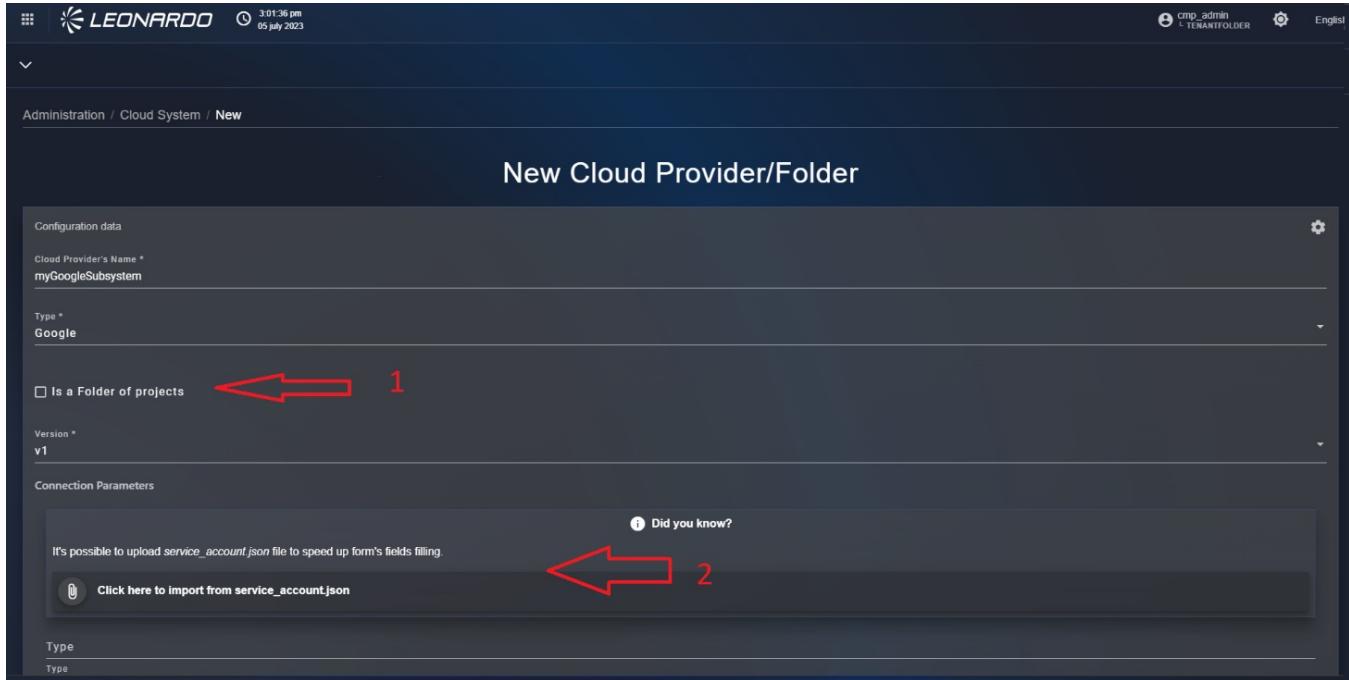


Figura 84 – Google Cloud specific parameters

The specific parameters for the Google Folder to be entered are shown in the table:

Name	Type	Description	Example
serviceAccount	object	Connection file generated from the Google console	service_account.json
costExportDatasetID	string	Enter the ID of the dataset to be used for information retrieval.	Projectid.dataset.table
usageAggregation	boolean	Indicates whether "usage" aggregation is enabled for the subscription. When this option is enabled, subsystem costs will be grouped by Resource Type.	false
Cost from USD Currency	Boolean	Indicates whether the final cost is calculated from the price in USD or EUR.	true
providerPriceDiscount (only if costFromUSDCurrency is true)	integer	Enter here a discount/markup to apply to provider prices in USD for all resources.	30
Cost cross project	Boolean	Indicates whether to retrieve costs for all projects in the billing account or only for the current project.	true



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Name	Type	Description	Example
catalogPriceDiscount	integer	Enter here a discount/markup to apply to catalog prices for all resources that do not have an SCMP relationship.	-20
odlID	string	Enter here the ID of the work order that will be associated with the subsystem and will be inserted as a tag on all subsystem resources.	ODL001
daysFirstCostRecover	int	Enter the number of days prior to the creation date for which costs should be recovered at the first startup of the subsystem.	15

■ Mandatory Enabled Services

The following services must be enabled on the service account used:

- bigquery.googleapis.com
- clouddresourcemanagement.googleapis.com
- cloudasset.googleapis.com
- cloudbilling.googleapis.com
- compute.googleapis.com
- container.googleapis.com
- monitoring.googleapis.com

The "ServiceAccount" field can be automatically entered by uploading the file or manually by entering the fields available in the form.

After configuring a "Folder" type system, it will be displayed in both the cloud provider list and the folders page.



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The screenshot shows the 'Cloud Systems' page under the 'Administration' module. The top navigation bar includes 'Cloud Systems', 'Cloud SIEMs', 'Key Vaults', and language settings ('English'). The main area displays a table of 'Cloud Systems list' with columns: Name, Type, Creation Date, On-Premises, and State. A red box highlights the 'Folders' tab in the top right of the table header. A red arrow points downwards towards this tab. The table data includes:

Name	Type	Creation Date	On-Premises	State
CMP Managed Folder	GOOGLE	20/05/2024 15:53:40	<input type="checkbox"/>	Green
CMP Managed Azure Folder	AZURE	20/05/2024 15:54:47	<input type="checkbox"/>	Green
MAE Digital Transformation	AZURE	20/05/2024 15:54:48	<input type="checkbox"/>	Green
MAE CMP	AZURE	20/05/2024 15:54:49	<input type="checkbox"/>	Green
MAE OSP 2030	AZURE	20/05/2024 15:54:49	<input type="checkbox"/>	Green
MAE LAB	AZURE	20/05/2024 15:54:49	<input type="checkbox"/>	Green
CONIF Management	AZURE	20/05/2024 15:51:15	<input type="checkbox"/>	Green
Cluster 02	OPENSHIFT	20/05/2024 16:48:48	<input type="checkbox"/>	Green
CMP-DEV3 CLUSTER	KUBERNETES	10/06/2024 13:47:59	<input type="checkbox"/>	Green

Figura 85 – Folder display

From the "Cloud System" page of the "Administration" module, click the "Folders" tab in the top right, which will display the list of folders configured in the tenant.

Within the page, the same view, modify, and delete operations can be performed on folders as those performed on the "Cloud Provider" page.



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The screenshot shows a dark-themed web interface for the Leonardo Secure Cloud Management Platform. At the top, there's a header with the Leonardo logo, the date and time (3:10:33 pm, 05 July 2023), and user information (cmp_admin, TENANTFOLDER, English). Below the header, a navigation bar has tabs for 'Cloud Systems' (which is active and highlighted in orange), 'Cloud SIEMs', and 'Key Vaults'. The main content area is titled 'Administration / Cloud System'. On the left, there's a sidebar labeled 'Folder list' with a table header: 'Name', 'Type', 'Creation Date', and 'On-Premises'. A single row is visible: 'ASL02 Folder' (Type: Google, Creation Date: 30/06/2023 16:21:22). To the right of the table are icons for edit, delete, and more options. A red arrow points from the bottom-left towards the 'Folders' tab in the top right corner of the header.

Figura 86 – Access to Folders

When accessing a "Folder" in "View" mode, scrolling down the page reveals a list of subsystems present in the provider and their status information:

- In green, we can see a subsystem correctly configured in the provider that the SCMP automatically adds to the system and will be visible in the "Cloud Providers" section and in all SCMP functionalities.
- In red, we can see an incorrectly configured subsystem which, after appropriate modifications from the "Google Cloud" console, can be accepted by the SCMP.



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The screenshot shows a user interface for managing subsystems. At the top, there are tabs for 'Cloud Systems', 'Cloud SIEMs' (which is selected), and 'Key Vaults'. The main area is titled 'Contained Subsystems' and lists several subsystems:

- ASL02-E-MANAGEMENT (highlighted with a green border)
- ASL02-B-TEAM-01
- ASL02-B-XLB-BACKEND-2
- ASL02-B-PRJ-SEC-SHARED (highlighted with a red border)

A message box for the red-highlighted subsystem states: "Warning: Subsystem not added (perhaps insufficient permissions?)". At the bottom right, there is a 'Close' button.

Figura 87 – Viewing subsystems of the Folder

4.0.2 SIEM

The user can create a SIEM provider by clicking on the tab depicting a shield, located in the top bar, after accessing the "Cloud SIEMs" page, in the top right, click on the hamburger menu and then click on "Attach a SIEM".



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Secure Cloud Management Platform

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a header with the Leonardo logo, date (19 june 2023), time (11:50:23 am), user (cmp_admin), and language (English). Below the header, the navigation bar includes 'Cloud Systems', 'Cloud SIEMs' (which is highlighted with a red circle), and 'Secrets Managers'. The current path is 'Administration / Cloud SIEMs'. The main content area is titled 'Security Information & Event Manager'. It displays a table titled 'SIEMs list' with one entry: 'SIEM Pro Edition' (Type: SENTINEL, UUID: 3bbc0471-3165-46fd-b937-e1c9bb8994ef, Creation Date: 30/01/2023 11:04:39). In the top right of this table, there are two red arrows pointing to the 'Attach a SIEM' button (with a plus sign) and the three-dot menu icon.

Figura 88 – Creating a cloud SIEM provider

On the "Add SIEM" page, fill in all fields in the "General properties" section. After doing this, fill in all fields in the "SIEM's properties" section according to the table:

The screenshot shows the 'Add SIEM' configuration page. At the top, it says 'Attach new SIEM'. The form is divided into two sections: 'General properties' and 'SIEM's properties'. In the 'General properties' section, 'Name' is set to 'SIEM - Business Edition' and 'Type' is set to 'SENTINEL'. In the 'SIEM's properties' section, there are five fields: 'clientId' (marked with an asterisk), 'clientSecret' (marked with an asterisk), 'resourceGroup' (marked with an asterisk), 'subscriptionId' (marked with an asterisk), and 'tenantId' (marked with an asterisk).



*Figura 89 – Filling out the form for
creating a SIEM provider*

Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	Unique ID of the SIEM to connect to, provided by the SIEM during application registration.	1b16698f-2df5-ed44-86b9ed-4b42c 1fe7ad9
clientSecret *	password	The secret to use for the connection, provided by the SIEM during application registration.	1b16698f-2df5-ed44-86b9ed-4b42c 1fe7ad9
resourceGroup *	string	The Azure resource group where the SIEM is hosted.	myGroup
subscriptionId *	string	The Azure subscription ID associated with the SIEM.	1b16698f-2df5-ed44-86b9ed-4b42c 1fe7ad9
tenantId *	string	The Azure tenant ID associated with the SIEM.	1b16698f-2df5-ed44-86b9ed-4b42c 1fe7ad9
workspaceID*	string	The Log Analytics workspace ID associated with the SIEM.	1b16698f-2df5-ed44-86b9ed-4b42c 1fe7ad9
workspaceName*	string	The name of the Log Analytics workspace associated with the SIEM.	theWorkspaceName

Finally, in the bottom right, click the "Save" button. Afterward, a popup will appear confirming the SIEM's creation, and the user will be redirected to the list of SIEMs.

4.0.2.1 Viewing, modifying, and deleting

To view a SIEM, next to it, click on the kebab menu and then click "Show". At this point, the user is on the "Show SIEM" page where data can be viewed but not modified. After viewing the data, in the bottom right, click the "Close" button. After this, the user is back on the list of SIEMs.



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The screenshot shows the 'Administration / Cloud SIEMs' section. The title is 'Security Informations & Events Managers'. Below it is a table titled 'SIEMs list' with columns: Name, Type, UUID, and Creation Date. One row is visible: 'Azure Sentinel CMP' (Type: SENTINEL, UUID: b8e937d1-9b23-4d90-963c-48ccd2f03828, Creation Date: 02/12/2022 17:16:44). To the right of the table is a context menu with options: Show, Edit, and Delete.

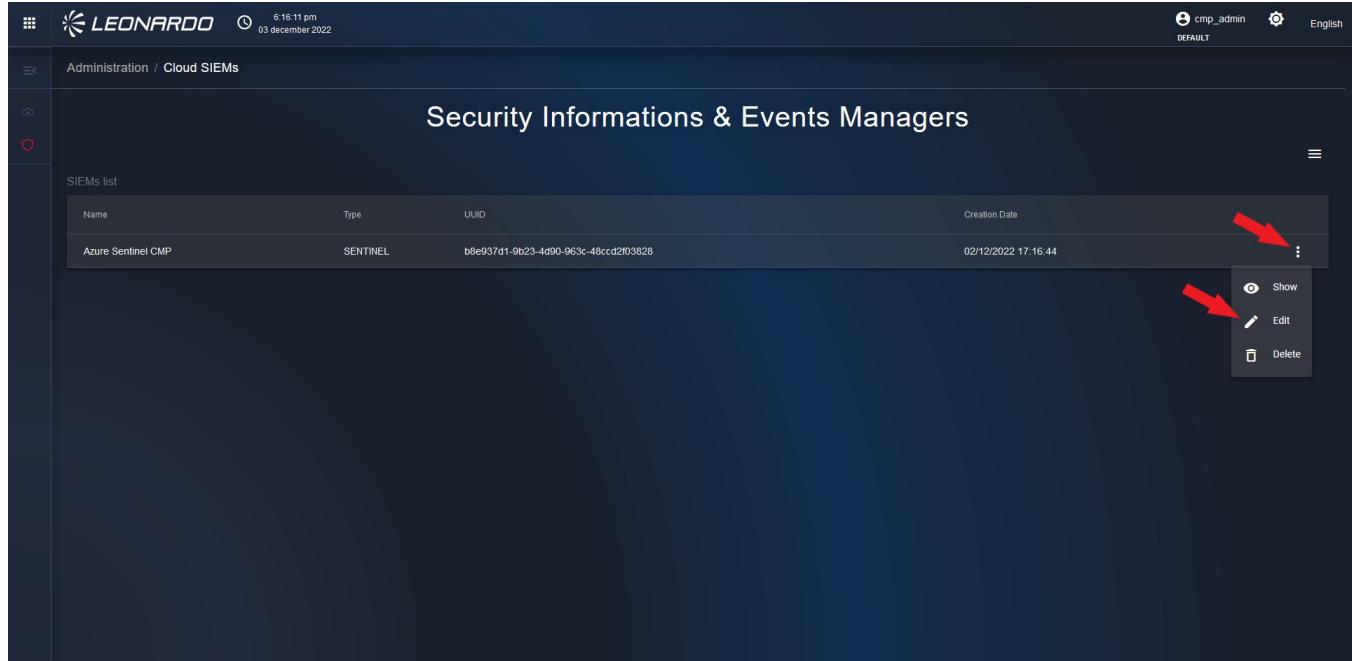
Figura 90 – Access to SIEM in view mode

The screenshot shows the 'Administration / Cloud SIEMs / Show SIEM' section. The title is 'Show SIEM b8e937d1-9b23-4d90-963c-48ccd2f03828'. It displays 'General properties' (Name: Azure Sentinel CMP, Type: SENTINEL, UUID: b8e937d1-9b23-4d90-963c-48ccd2f03828, Creation Date: 2022-12-02T17:16:44.02) and 'SIEM's properties' (clientId, clientSecret, resourceGroup: sentineltest).

Figura 91 – SIEM in view mode

To modify a SIEM, next to it, click on the kebab menu and then click "Edit". At this point, you are on the "Edit SIEM" page where fields can be modified.

After modifying the fields of interest, in the bottom right, click the "Update" button. After this, a popup will appear confirming the SIEM's modification, and the user will be back on the list of SIEMs.



The screenshot shows the 'Cloud SIEMs' section of the Leonardo platform. The table lists one SIEM entry:

Name	Type	UUID	Creation Date
Azure Sentinel CMP	SENTINEL	b8e937d1-9b23-4d90-963c-48cc2f03828	02/12/2022 17:16:44

Next to each row is a vertical ellipsis menu. A red arrow points to the first ellipsis menu, and another red arrow points to the 'Edit' option within the dropdown menu that appears when it is clicked.

Figura 92 – Access to SIEM in edit mode



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The screenshot shows the 'Edit SIEM' page for a specific instance. The top navigation bar includes the Leonardo logo, user information (cmp_admin, DEFAULT), and language selection (English). The main content area has two sections: 'General properties' and 'SIEM's properties'. In 'General properties', fields include Name (Azure Sentinel CMP), Type (SENTINEL), UUID (b8e937d1-9b23-4d90-963c-48ccd2f03828), and Creation Date (2022-12-02T17:16:44.02). In 'SIEM's properties', fields include clientId, clientSecret, and resourceGroup (sentineltest). Below these sections is a form with fields: subscriptionId (09837d5-2dd0-4623-9b82-5a510fd983d2), tenantId, workspaceId (6aa7ef19-6586-45df-8aea-e59335bba3d7), and workspaceName (workspacedev). A red 'Update' button is located at the bottom right of the form.

Figura 93 – SIEM in edit mode

To delete a SIEM, next to it, click on the kebab menu and then click "Delete". At this point, a modal will appear where you need to click the "Remove" button. After this, the SIEM is no longer present in the list.



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The screenshot shows the 'Administration / Cloud SIEMs' section. A table lists a single SIEM entry: 'Azure Sentinel CMP' (Type: SENTINEL, UUID: b8e937d1-9b23-4d90-963c-48cccd2f03828, Creation Date: 02/12/2022 17:16:44). To the right of the table is a context menu with three options: 'Show', 'Edit', and 'Delete'. A red arrow points to the 'Delete' option.

Figura 94 – Option to delete a SIEM
"Delete"

The screenshot shows the same 'Administration / Cloud SIEMs' section. A confirmation dialog box is displayed over the table, asking 'Are you sure you want to delete the SIEM b8e937d1-9b23-4d90-963c-48cccd2f03828?'. The dialog has 'Cancel' and 'Remove' buttons. A red arrow points to the 'Remove' button.

Figura 95 – Confirmation to delete a
SIEM

4.0.3 Secrets Managers

The user can create a secret manager by clicking on the tab depicting a padlock, located in the top bar, as shown in the figure.

After accessing the "Secret manager" page, in the top right, click on the hamburger menu and then click on "Add a secret manager".

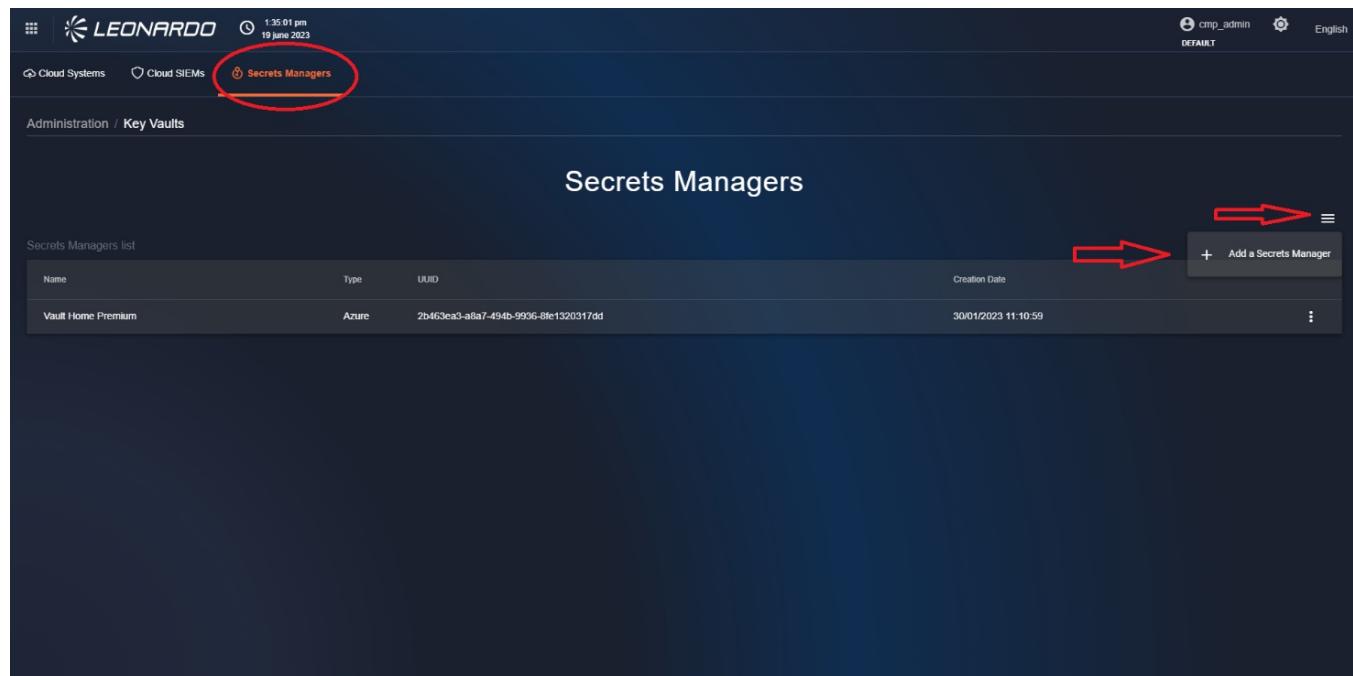


Figura 96 – Adding a new Secret Manager

Here is an example form for adding a Secret manager from an Azure type provider (selectable from the "Type" dropdown at the top of the page).

After entering all the required parameters, click the "Save" button at the bottom to complete the entry, and the user will be redirected to the "Secret manager" list where the newly created component can be viewed.

4.0.3.1 Azure Key Vault

The specific parameters for an Azure Key Vault to be entered are shown in the table:



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The screenshot shows a configuration interface for an Azure Key Vault. At the top, there are navigation links for Cloud Systems, Cloud SIEMs, and Key Vaults, with Key Vaults being the active tab. The main area contains several input fields:

- General properties:** Name (mandatory)
- Azure Key Vault:**
- Secrets Manager's properties:**
 - clientid * (mandatory)
 - clientSecret *
 - resourceGroup *
 - subscriptionId *
 - tenantId *
 - privateUrl *

A "Save" button is located at the bottom right of the form.

*Figura 97 – Azure Key Vault
configuration mask*

Parameters indicated with * are mandatory.

Name	Type	Description	Example
clientId *	string	Unique identifier of the key vault.	09f8985-9f89d0-4623-98982-5a510fd3d2
clientSecret *	password	A secret key used to authenticate the application with the Key Vault.	np6Kc_.xwsvhR8Q~rP05fCqYNXmbqfMGQLOEzfMt
resourceGroup *	string	The Azure resource group where the Key Vault is hosted.	resourceGroupName
subscriptionId *	string	The Azure subscription ID associated with the Key Vault.	09f8985-9f89d0-4623-98982-5a510fd3d2
tenantId	string	The Azure tenant ID associated with the Key Vault.	09f8985-9f89d0-4623-98982-5a510fd3d2
privateUrl	string	Private access URL to the Key Vault.	https://vault.azure.net/vault

Table 25 – Azure Key Vault specific fields

4.0.3.2 Google Secret Manager



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The specific parameters for the Google Secret Manager to be entered are shown in the following table:

Figura 98 – Google Secret Manager configuration mask

Parameters indicated with * are mandatory.

Name	Type	Description	Example
kmsProjectId *	string	The Google Cloud Platform (GCP) project ID associated with the Google Cloud Key Management Service (KMS).	5a85c16c6ad-49db-a58e-e209-ee11f53d6c6b
serviceAccount *	object	Connection file generated from the Google console.	service_account.json

It is possible to manually enter the parameters present in the “service_account.json” file into the displayed form if you do not want to upload it. All parameters are mandatory:

Name	Type	Description	Example
Type	string	Enter the name of the configured authentication type.	service_account
project_id *	string	Enter here the unique ID of the project associated with the service account.	Theproject-367810



Name	Type	Description	Example
private_key_id *	string	Enter here the unique ID of the service account's private key.	55cb5cf903ee93ea1e9c294a07e46e0af0633e6
private_key *	password	Contains the service account's private key in PEM format. It is essential for authenticating the service account to Google Cloud APIs.	-----BEGIN PRIVATE KEY-----MIIJQgIBADANB...
client_e-mail *	string	The unique email address of the service account. It is used to identify the service account when authenticating to Google Cloud APIs.	user@dominio.com
client_id *	string	The client ID of the service account. It is a unique identifier used to identify the service account in Google Cloud.	104822473261100667392
auth_uri *	string	The URI used for authenticating the service account to Google Cloud APIs.	https://accounts.google.com/o/oauth2/auth
token_uri *	string	The URI used to obtain an access token for the service account.	https://oauth2.googleapis.com/token
auth_provider_x509_cert_url*	string	The URL of the X.509 certificate used for authenticating the service account.	https://www.googleapis.com/oauth2/v1/certs
client_x509_cert_url *	string	The URL of the X.509 certificate in the client.	https://www.googleapis.com/robot/v1/metadata/f543/myserviceaccount%40projectName.gserviceaccount.com

4.0.3.3 Viewing, modifying, and deleting a system

It is possible to view the data of a Secret Manager, within the list, by clicking on the kebab menu corresponding to a manager, and then on "Show".



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Name	Type	UUID	Creation Date	Actions
Vault Home Premium	Azure	2b463ea3-a8a7-494b-9936-8fe1320317dd	30/01/2023 11:10:59	Show Edit Delete

Figura 99 – Access to manager in view mode

On this page, you can view the Provider's configuration.

Secrets Manager's properties

clientId
1b42c98f-2df5-446b-89ed-4b1fe7166ad9

clientSecret
sentineltest

subscriptionId
09f837d5-2dd0-4623-9b82-5a510fd983d2

tenantId
70fc5a88-7c0f-42ad-9db2-35d1222673c6

privateUrl
https://vaulttestcmp.vault.azure.net/

Figura 100 – manager in view mode

To return to the Secret manager page, click the "Close" button in the bottom left.

At this point, the user will be on the Secret manager page.



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To modify the data of a Secret manager within the list, click on the kebab menu corresponding to a Cloud Provider, and click on "Edit".

The screenshot shows a dark-themed web interface for managing secrets managers. At the top, there are navigation links for 'Cloud Systems', 'Cloud SIEMs', and 'Secrets Managers'. The 'Secrets Managers' link is underlined, indicating it is the active page. Below the navigation, a breadcrumb trail shows 'Administration / Key Vaults'. The main title is 'Secrets Managers'. A table lists a single entry: 'Vault Home Premium' (Type: Azure, UUID: 2b463ea3-a8a7-494b-9996-8fe13203170d, Creation Date: 30/01/2023 11:10:59). To the right of the table is a context menu with options: 'Show' (eye icon), 'Edit' (pencil icon, highlighted with a red arrow), and 'Delete' (trash bin icon).

Figura 101 – Access to manager in edit mode

After doing so, the user will be on the Cloud Provider page in edit mode where data can be modified. To return to the Cloud Provider page, click the "Save" button in the bottom left. At this point, the user will be on the Cloud Provider page.

To delete a "Secret manager", within the list, click on the kebab menu corresponding to a Secret manager, and click on "Delete".



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The screenshot shows the 'Secrets Managers' section of the Leonardo platform. It lists a single entry: 'Vault Home Premium' of type 'Azure'. The 'Delete' button in the actions column is highlighted with a red arrow.

Name	Type	UUID	Creation Date
Vault Home Premium	Azure	2b463ea3-a6a7-494b-9936-8fe1320317dd	30/01/2023 11:10:59

Figura 102 – Initiating the deletion of a Secret manager

After doing so, a modal will appear where you need to click the "Remove" button.

The screenshot shows a confirmation dialog box titled 'Confirm Secrets Manager deletion' asking if the user is sure they want to delete the 'Vault Home Premium' secret manager. The 'Remove' button is highlighted with a red arrow.

Figura 103 – Confirm Secret manager

deletion

At this point, the Secret manager will no longer be present in the list, and the asset removal flow will be launched on the resource-manager.

4.0.4 Backup

The user is given the ability to connect the SCMP to a CommVault to subsequently retrieve and display information related to backups and operations performed by the Vault.

To access this functionality, you need to select the "CommVault" tab available at the top of the "Administration" functionality.

We will be directed to the page containing the list of all configured "CommVaults", and by clicking on the menu on the right, it will be possible to add a new CommVault.

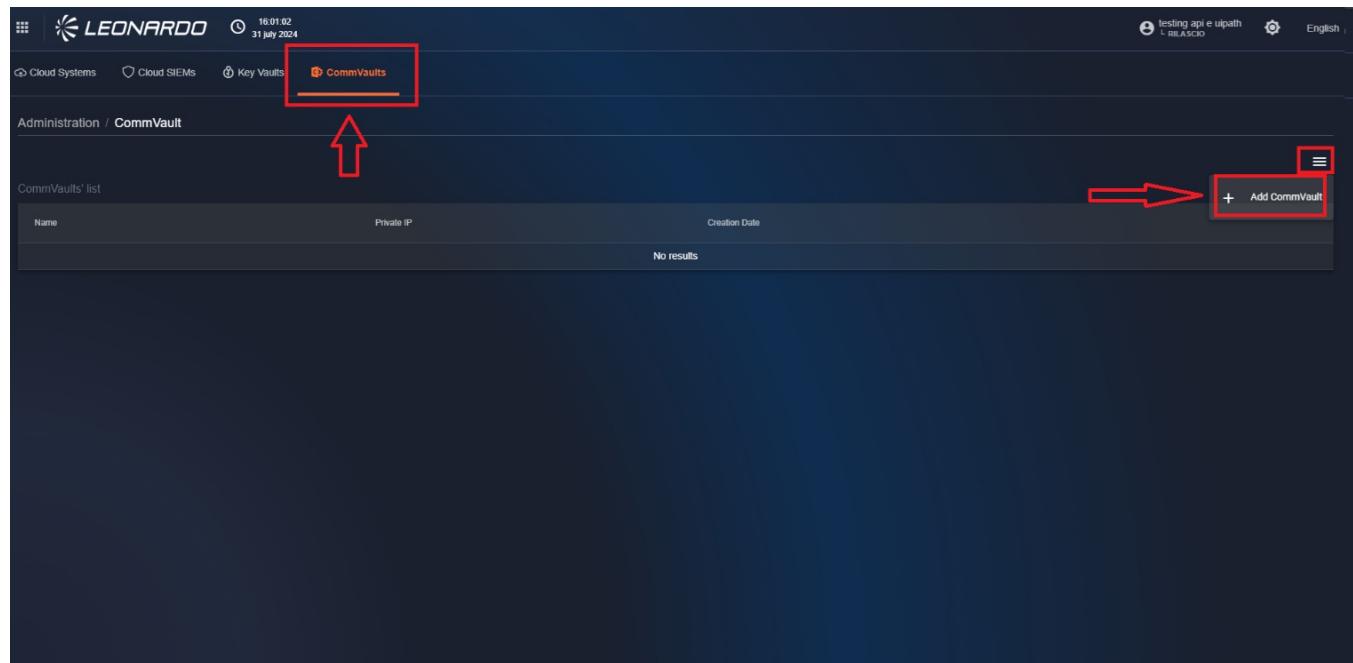


Figura 104 – Access to CommVault

On this page, after entering the access credentials (IP address, username, and password), we can click the "Test connection" button to confirm the correct data entry and then confirm the entry via the "Save" button.

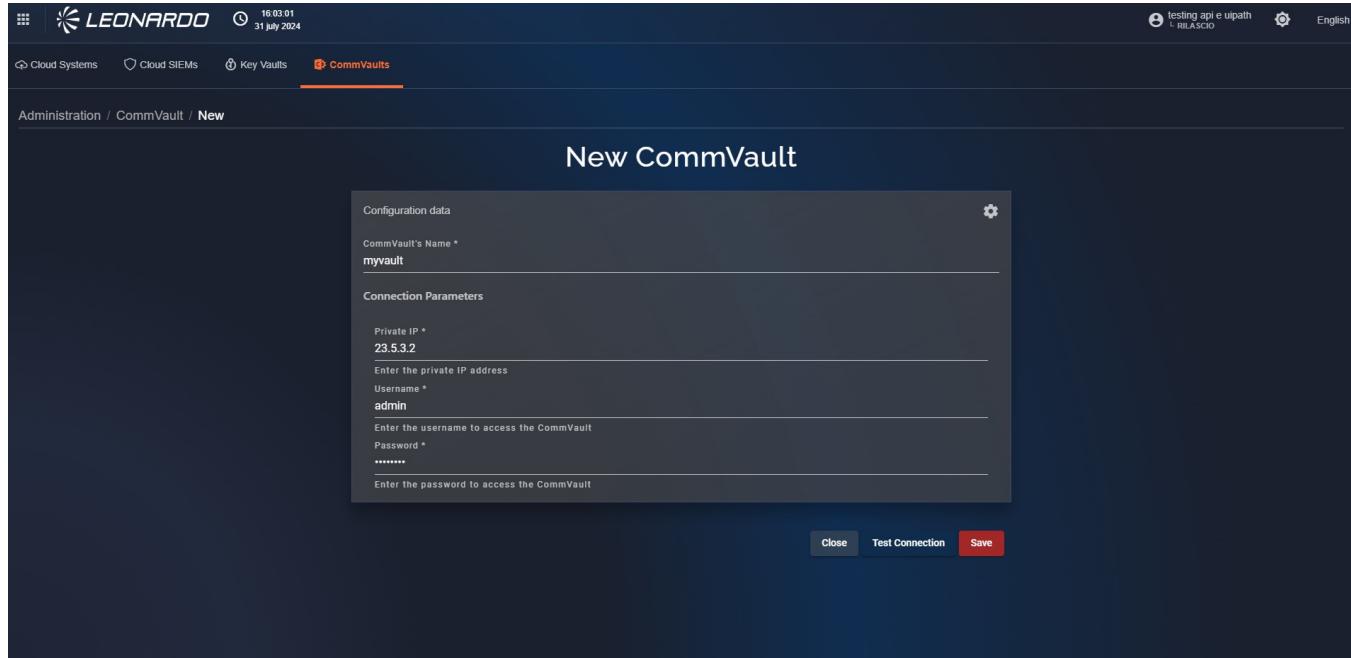


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*Figura 105 – Creating the connection to
a CommVault*

4.0.5 Confidential computing

In the Confidential Computing section, the user is given the ability to add a connection to a "Remote Attestation" service within the SCMP to control and view information regarding the confidentiality status of machines managed by the service.

To access this functionality, you need to select the "Confidential computing" tab available at the top in the "Administration" functionality.

We will be directed to the page containing the list of all configured "Remote attestation" services, and by clicking on the menu on the right, it will be possible to add a new connection.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Cloud Systems, Cloud SIEMs, Key Vaults, CommVaults, and Confidential Computing. The Confidential Computing link is highlighted with a red box and has an arrow pointing to it from the left. Below the navigation bar is a breadcrumb trail: Administration / Confidential Computing. The main content area is titled "Remote Attestations' List" and shows a table with columns for Name, URL, and Creation Date. A message at the bottom of the table says "No results". In the bottom right corner of the main content area, there's a button labeled "+ Add Remote Attestation" with a red box around it and an arrow pointing to it from the right.

Figura 106 – Access to Confidential Computing

On this page, after entering the access credentials (IP address, username, and password), we can click the "Test connection" button to confirm the correct data entry and then confirm the entry via the "Save" button.

The screenshot shows a modal dialog box titled "New Remote Attestation". The dialog has a header "Configuration data" and a "Close" button. Inside, there are two sections: "Remote Attestation's Name *" and "Connection Parameters". The "Connection Parameters" section contains fields for "Username *" (with placeholder "Type here the username of the remote attestation profile") and "Password *" (with placeholder "Type here the password of the remote attestation profile"). Below these is a "Url *" field (with placeholder "Type here the connection url to remote attestation server"). At the bottom of the dialog are three buttons: "Close", "Test Connection", and "Save".



*Figura 107 – Creating the connection to
a "Remote Attestation" service*

5 Dashboard

Accessing the SCMP, the homepage presents a summary of four sections: inventory, monitoring, costs, and security.

In particular:

- The Inventory section shows:
 - A pie chart regarding SCMP resources (for each resource of a single provider, an SCMP type instance is created, so the data can be considered as the sum of all resources present across all providers).
 - A pie chart for each provider type.
- The monitoring section shows the most populated metrics with their relative usage.
- The costs section shows a summary of costs for the last 30 days.
- The security section shows the most severe vulnerabilities.

The title of each section is clickable and leads to the specific dashboard.



*Figura 108 – Dashboard section
"Inventory"*



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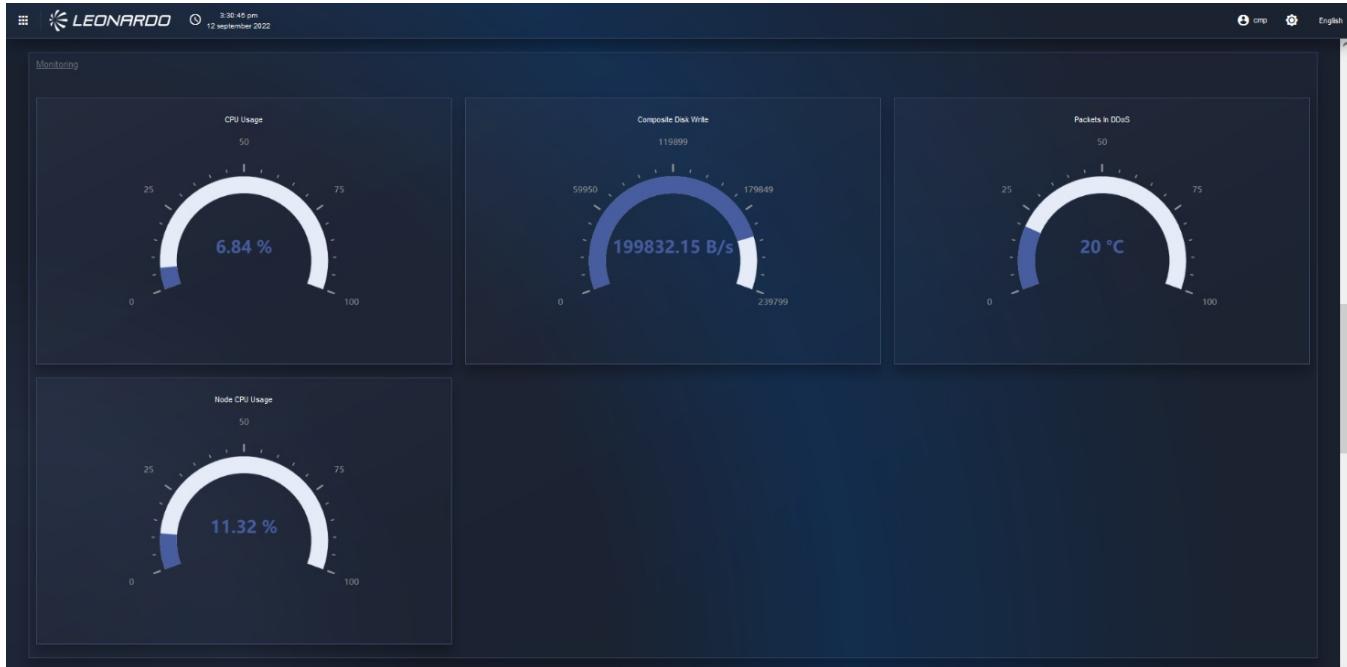


Figura 109 – Dashboard section
"Monitoring"

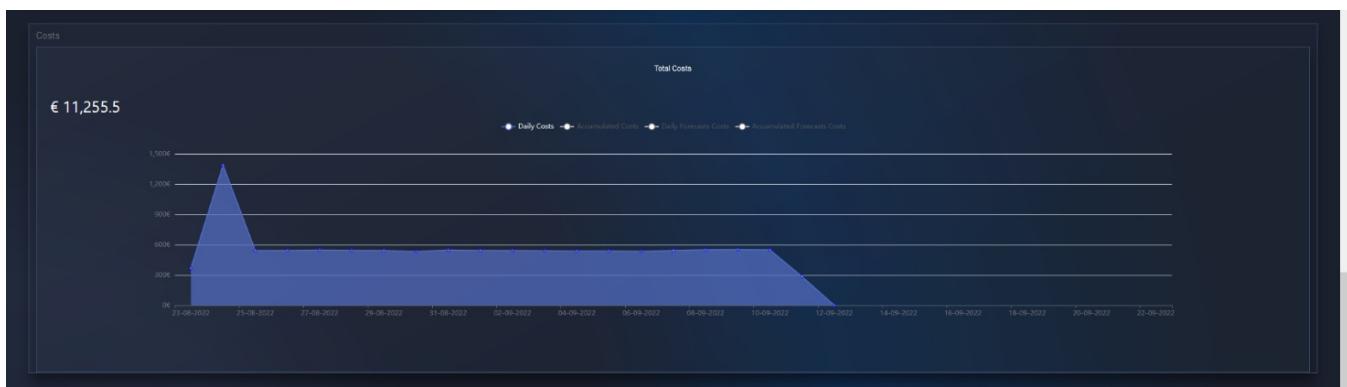


Figura 110 – Dashboard section "Costs"



*Figura 111 – Dashboard section
"Security"*

6 Inventory

The inventory functionality collects metadata of installed assets across all providers present on the SCMP.

The assets currently present are:

- Virtual Machine
- Data Stores
- Networks
- Clusters
- Edge
- Security
- Others

Heterogeneous metadata, coming from different sources, is then normalized by the SCMP to allow for standard visualization.

Inventory is accessible from the “Inventory” menu item.



Figura 112 – Accesso a Inventory

6.0.1 Inventory Dashboard

The Dashboard page provides a global and aggregated view of all resources, while the menus above the breadcrumb path allow filtering by resource type. The functionalities available on the various pages are identical.

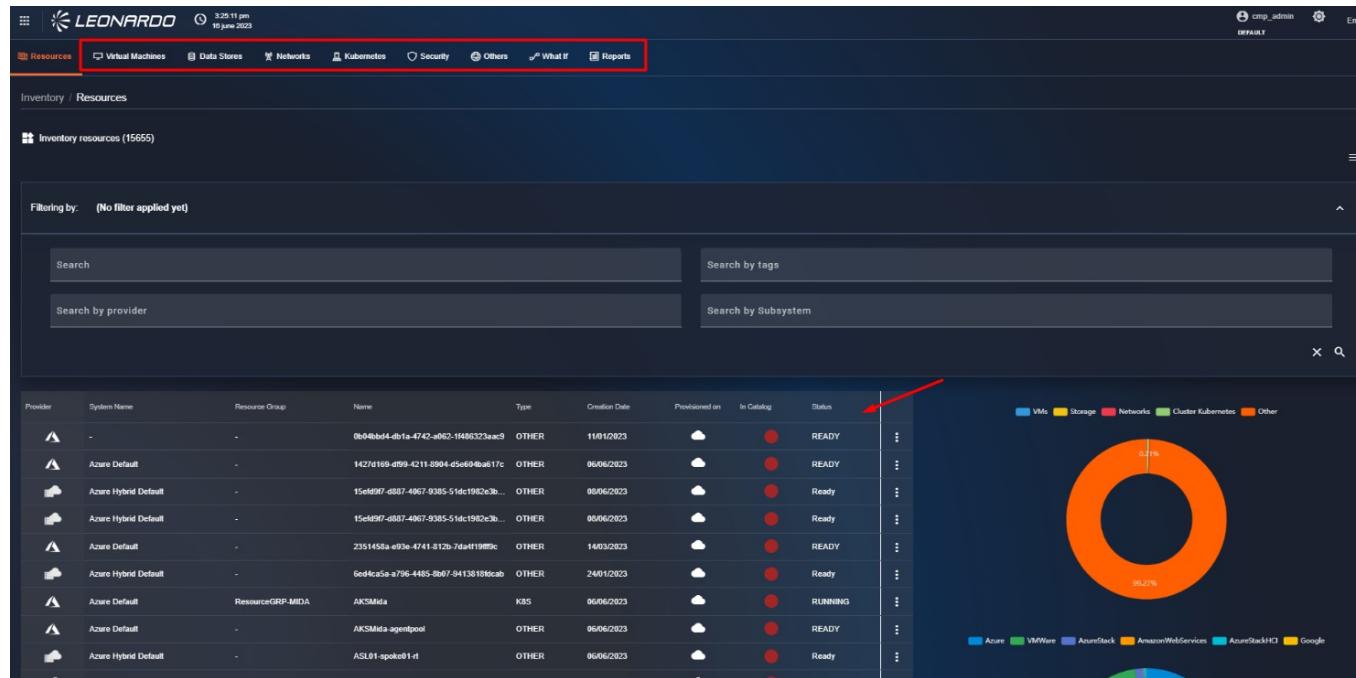


Figura 113 – dashboard di inventario

Within the “Resources” tab page, there are filters; in the first filter at the top, it is possible to search for resources by name, resource group, Provider, etc. It is also possible to filter resources by “Provider” and “Subsystem”.

The last filter allows searching by tag. Click on it and select a tag, then by clicking the button depicting a magnifying glass, the page will refresh and display the list of filtered resources.



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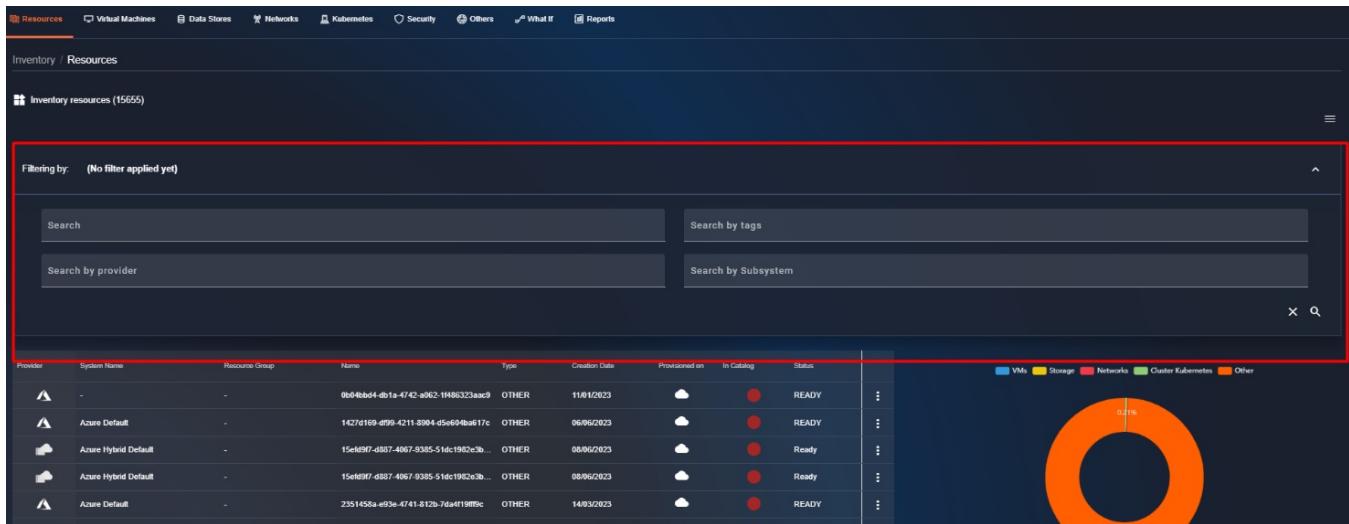


Figura 114 – Ricerca generica, per tag,
per Provider e Subsystem

It is also possible to click on the graphs to automatically apply the relevant filters.

6.0.1.1 Resource detail view

To view the details of a resource, you can click as shown in the figure:

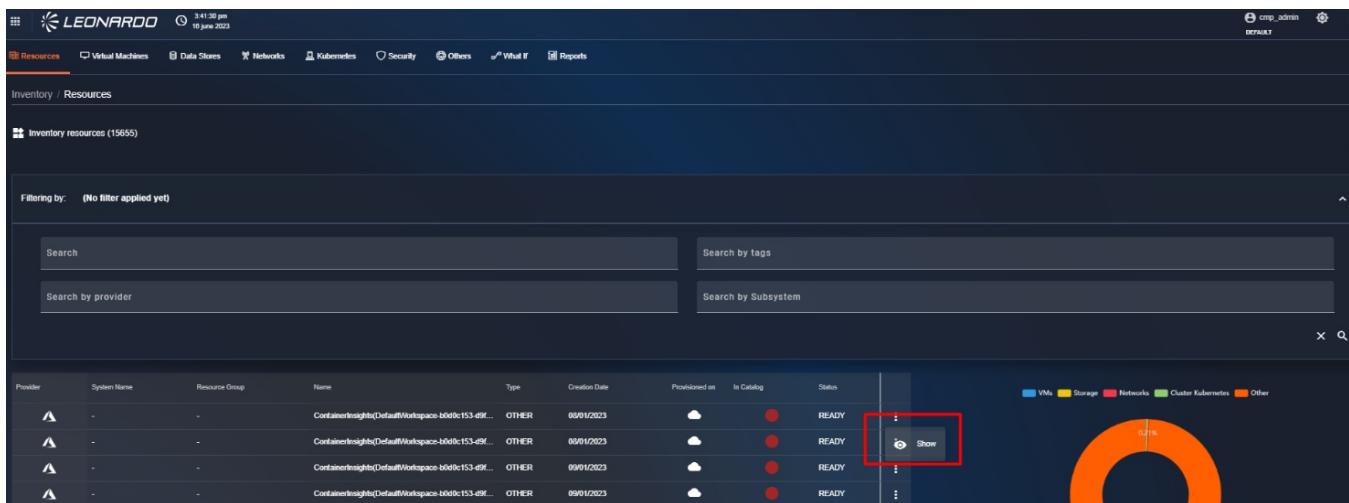


Figura 115 – Accesso alla risorsa in
modalità lettura

The detail of an inventory asset shows the main characteristics at the top, such as monthly cost, machine size, and an external link to the resource pointing to the reference provider.



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Below is the detailed view of a VM:

Virtual Machine (v1.1)		Details	
System	CMP	Monthly Cost	0.60
State	POWERED_ON	Name	Test21
Update Date	08/09/2023	OS Type	Linux
Provider	AzureStack	Category	Standard_F4s_v2
Resource Link	View		
Networking			
Interface Test21-eth0			
Public IP Address	-		
Private IP Address	172.16.0.12	IP Version	IPv4
State	Succeeded		

Figura 116 – Dettaglio risorsa

And at the bottom, the asset's relationships with other SCMP elements, as shown in the figure:

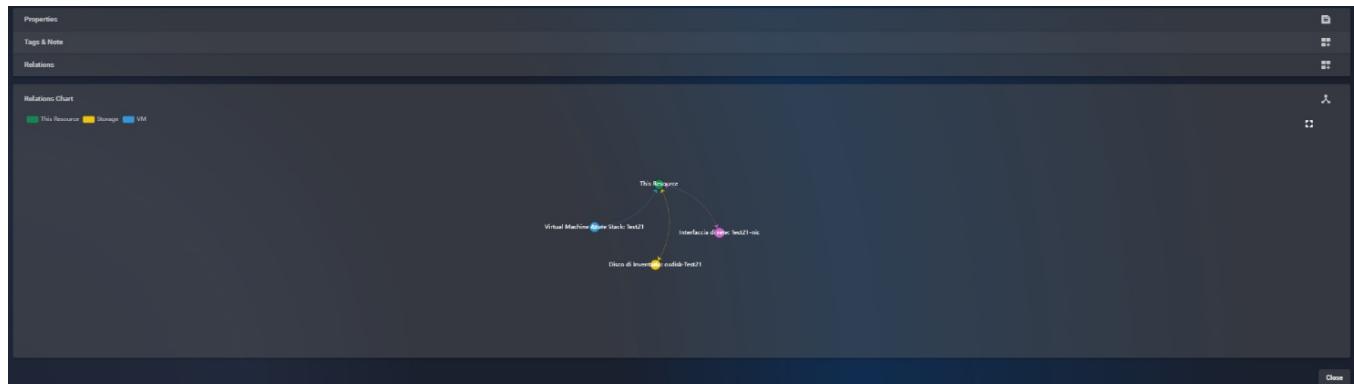


Figura 117 – Grafico delle relazioni

The relationship graph allows navigating between resources by directly clicking on the circle of the linked resource, in order to land on its details.

Furthermore, it is possible to edit some attributes, such as tags, as shown in the figure:



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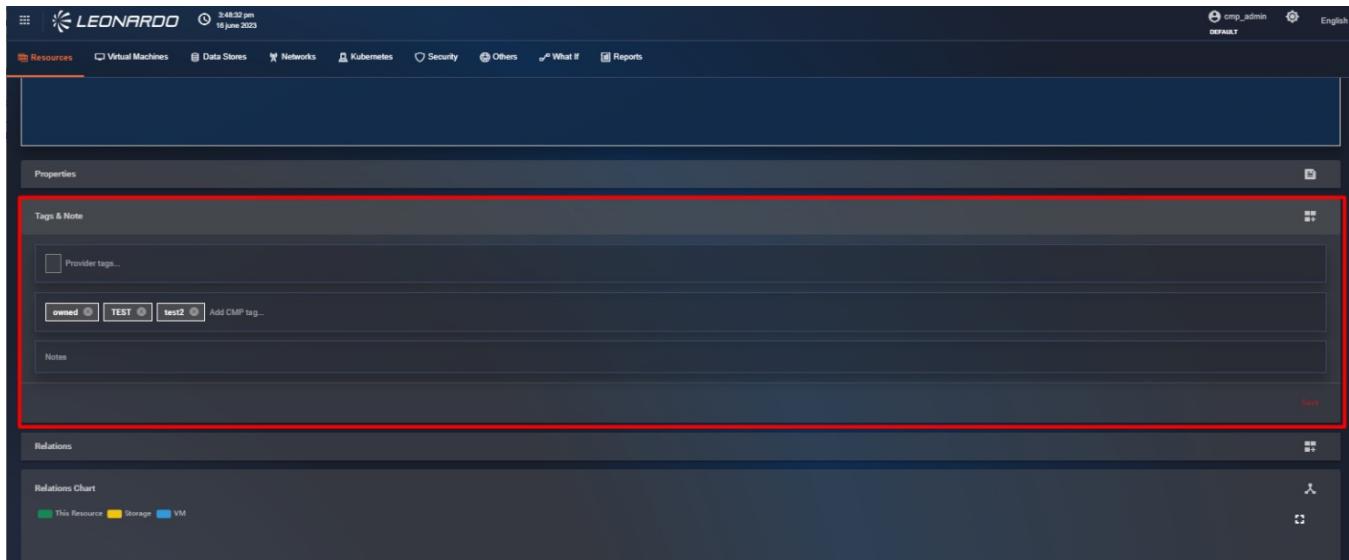


Figura 118 – Selezione del tag

For the “Provider Tags...” field, it is not possible to select a tag, as tags in this section are retrieved directly from the subsystem.

The “Add SCMP Tag...” field allows selecting from a list or manually entering one. Inside the tag, there is an “X” symbol to delete it.

It is possible to add multiple tags to the resource.

Subsequently, in the bottom right of the “Tags & Note” section, click on the “Save” button to save the change, and a banner will appear at the bottom indicating the tag has been saved.

Scroll the page to the bottom, and click on the “Close” button located on the right to return to the “Dashboard” tab page.

6.0.1.2 Actions on inventory machines

For inventory machines from supported providers, a new button available in the table context menu called “Manage” can be used to perform basic operations on the machines.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. The top navigation bar includes links for Resources, Virtual Machines, Data Stores, Clusters, Edge (selected), Networking, Security, Others, What If, and Reports. The main area is titled 'Inventory / Edge Devices' and shows 'Inventory resources (2)'. A filtering bar indicates 'Filtering by: TYPE EDGE'. Below this are search and subsystem search fields. The main table lists two resources: 'marco01' and 'rheledge01', both of which are 'EDGE' type and currently 'Started'. For each row, there is a context menu with options like 'Show' and 'Manage'. A red arrow points to the 'Manage' button in the menu for 'rheledge01'. A large circular progress bar at the bottom right indicates '100% REDHATEDGE'.

*Figura 119 – Accesso alla funzionalità
di "management"*

From this resource detail page, the following operations can be performed using the menu at the top of the page; the operations available on the machines may vary depending on the provider:

Azure Stack HCI

- Start machine
- Stop machine
- Resize machine
- Add storage disks
- Add network interface
- Delete resource
- Remove disk from resource
- Remove network interface

Red Hat Edge

- Update an EDGE device image



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Operations are indicated in white when they can be executed and in gray when they are not supported or unavailable for the resource.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a header with the Leonardo logo, the date and time (3:55:43 pm, 05 July 2023), user information (cmp_admin - DEFAULT, English), and a gear icon. Below the header is a navigation menu with links to Resources, Virtual Machines (which is the active tab), Data Stores, Networks, Clusters, Security, Others, What If, and Reports. Underneath the menu, a breadcrumb trail shows 'Inventory / Virtual Machines / Manage 64a526744bfbe4f2c8b9ff86'. The main content area is titled 'Manage Virtual Machine di Inventory' and contains two main sections: 'Virtual Machine (v1.1)' and 'Details'. The 'Virtual Machine' section lists System (CMP), State (POWERED_OFF), Update Date (05/07/2023), Provider (VMWare), and Resource Link (https://10.129.5.31/ui/app/home). The 'Details' section shows Monthly Cost (0.00), Name (DNS-Server01), OS Type (-), and Category (vm-4019). Below these sections is a 'Disks' section with a table for 'Disk CMP_01' showing Size (GB) (-), IOPS (-), Throughput (-), and State (ATTACHED). A red box highlights the top navigation bar with options like Start, Stop, Resize, Attach Disk, etc.

Figura 120 – Operazioni sulle macchine
di inventario

6.0.1.3 “Cluster Explorer” functionality

Cluster Explorer is a powerful feature that allows users to view namespaces within a cluster in detail. This function provides a comprehensive overview of data and resource organization within the cluster, facilitating navigation and management of complex environments.

With Cluster Explorer, users can:

- View the complete list of namespaces in a cluster: Get a quick overview of all available namespaces in the cluster.
- Examine the details of each namespace: Access complete information about each namespace, including name, description, labels, and resource quotas.
- Filter and search namespaces: Quickly find specific namespaces using advanced filtering and search criteria.

To access the functionality, select the “Clusters” item from the horizontal menu of the Inventory module.



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Provider	Name	System	Size	Resource Group
AKSMida	MAE Digital Transformation	Basic	ResourceGRP-MIDA	⋮
CMP-DEV3	MAE CMP	Basic	CMP-DEV3	⋮
CMP-PROD	MAE CMP	Basic	CMP-PROD	⋮
MM-Test-Cluster	MAE CMP	Basic	MM-Test	⋮
Trading-AKS-MIDA	MAE Digital Transformation	Basic	ResourceGRP-MIDA	⋮
aks-x2030-dev-westeurop...	MAE OSP 2030	Basic	rsg-x2030-dev-westeurop-001	⋮

Pie Chart Data:

- Azure: 58.33%
- Kubernetes: 16.67%
- Oracle: 8.33%
- OpenShift: 16.67%

Figura 121 – Accesso alla funzionalità di cluster explorer

Inside the page, a list of clusters present within the subsystems configured in the system will be displayed. Clicking on one of them will open a modal with the general details of the cluster.

Cluster Details:

- Cluster**: Kubernetes di Inventario (v1.1)
- System**: CMP
- State**: Running
- Update Date**: 12/06/2024 08:09:10
- Provider**: Kubernetes

Pie Chart Data:

- Italy Northwest (Milan): 16.67%
- West Europe: 65.57%
- N / A: 8.33%

Figura 122 – Finestra di dettaglio del cluster

We can notice that at the bottom right there is a “cluster explorer” button; pressing it will redirect us to the cluster Dashboard. This page can also be accessed using the “cluster explorer” button available in the “three dots” context menu present for each cluster in the list of results.

Within this page, we can view a graph representing the distribution of namespaces within the cluster; on the right, the legend of namespaces with the number of active pods is displayed.

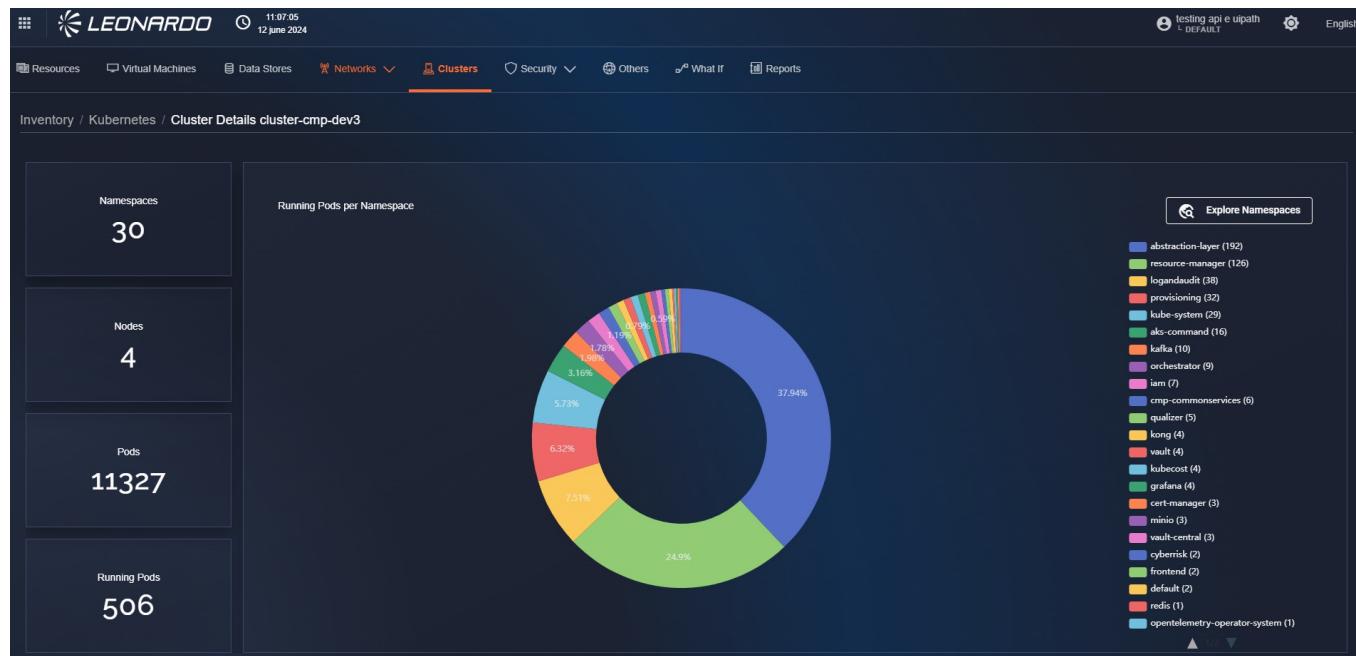


Figura 123 – Dashboard del “cluster explorer”

We can drill down into the details of namespaces using different components on the page:

it is possible to click on the “Explore namespaces” button at the top right or click on the number of namespaces displayed at the top left to view the namespace exploration page without filters. If we want to directly view the details of a namespace present in the graph, it is possible to click on the corresponding slice, and the detail page will be automatically filtered for the selected namespace.



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Figura 124 – Pagina "Namespace explorer"

The namespaces field at the top allows searching among available clusters by entering free text. If a match is found, you can select the namespace from the list to view its details.



Figura 125 – Dettaglio dei namespace

Using the “Down Arrow” commands, it will be possible to navigate between available categories and sub-categories of elements. Finally, by selecting a result, its details will be displayed in the right section of the page, which will be automatically populated with the selected result from the left.

Creation Date: 10/05/2024 14:13:10 | Update Date: 12/06/2024 09:07:11 | Description: kubernetes namespace inventario | State: ACTIVE

Quotas -

View as: grid list

Workload

POD (229)

- command-94...
- command-5fd...
- command-29...
- command-16...
- command-b1...
- command-0a...
- command-c3...
- command-bf2...
- command-aa...
- command-a8...
- command-42...
- command-6d...
- command-40...
- command-08...
- command-e7...
- command-9d...

Configuration

Creation Date: 22/05/2024 05:05:30
Name: command-9492279db8094af4968e3cdb0213f53f
Description: kubernetes pod inventario
State: FAILED
ID: 664d7d1a3c94de4c658f79ca
UUID: e2bbbd1b-4d84-41db-ae07-038d60e1aa3b
Node Name: aks-poolnew-67150953-vmss000000
Pod IP Address: 10.244.4.152
Host IP Address: 198.18.110.18
State: SUCCEEDED
App Name: undefined

Name	CPU Limit	CPU Request	Memory Limit	Memory Request
user-command	500 m	200 m	1.073.741.824 B	524.288.000 B

Figura 126 – Dettagli del contenuto del namespace

6.0.2 “WHAT IF” Functionality

This functionality allows performing simulations for asset migration from one provider to another, or within the same provider, in order to compare management and maintenance costs.

To run a simulation, click on the tab above the breadcrumb path that depicts a relationship connecting two entities, named ‘What If’.

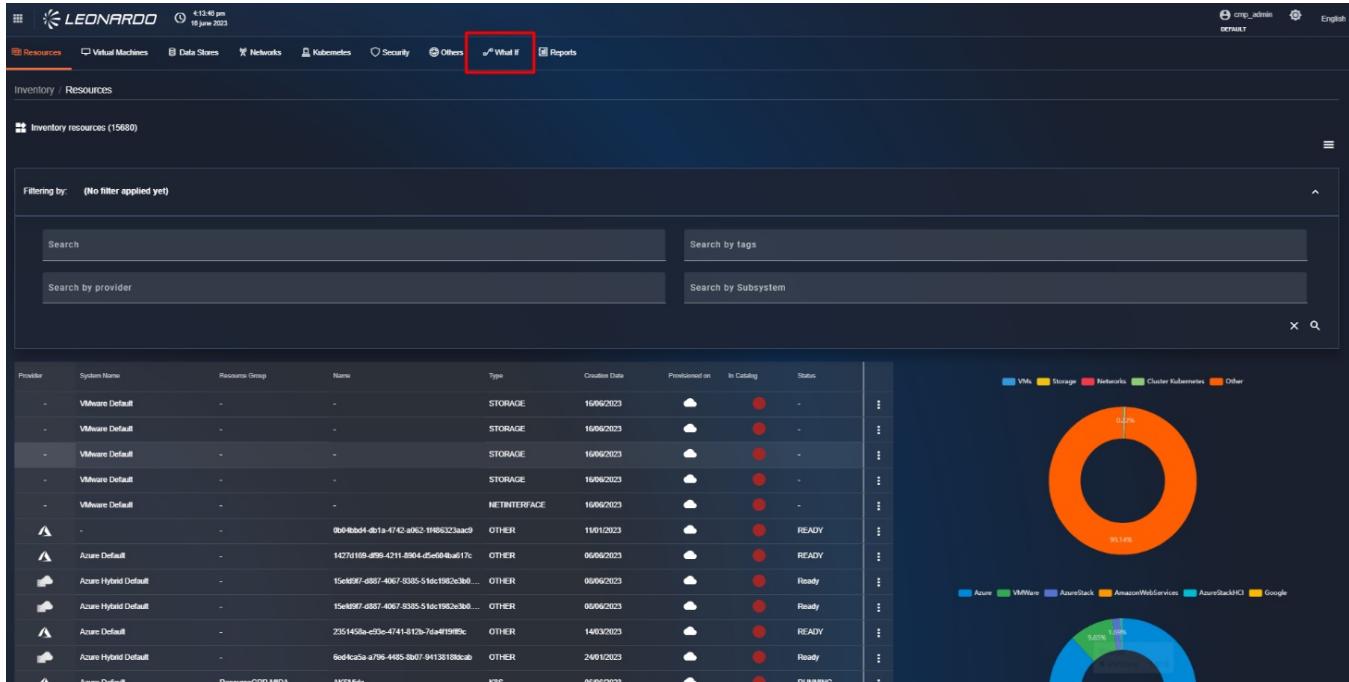


Figura 127 – Accesso a “What If”

After doing so, you will find yourself on the “What If” tab page.

Above the list of simulations, on the right, we can notice two tabs that allow filtering the list by simulation type, specifically:

upon opening the page, all “Change Provider” type simulations will be displayed, while clicking on the “Capacity” tab will allow viewing the list of “Change size” type simulations.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there is a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Kubernetes, Security, Others, What If (which is highlighted), and Reports. Below the navigation bar, the URL is shown as Inventory / What If.

In the center, there is a question: "What do you want to simulate today?". Two options are displayed in boxes: "Migrate to another provider" (with a circular arrow icon) and "Change resources capacity" (with a bar chart icon). Below these options, a link says "... or take a look to a previous simulation:". A red arrow points from this link down to a table of previous simulations.

The table has columns for Name, Creation Date, Destination Providers, Status, Export, and Options. It lists five entries, all of which have a green status circle and a download icon. The table includes a filter bar at the top right labeled "Filter simulations: Provider Migration Capacity".

Name	Creation Date	Destination Providers	Status	Export	Options
Multiple Provider Migration	18/04/2024 10:05	Azure, Google, Oracle	Green	Download	⋮
Multiple Provider Migration	18/04/2024 10:02	Azure, Oracle	Green	Download	⋮
Multiple Provider Migration	15/04/2024 14:39	Google, Azure, Oracle	Green	Download	⋮
Multiple Provider Migration	15/04/2024 12:59	Google, Oracle	Green	Download	⋮
Multiple Provider Migration	11/03/2024 10:24	Google, Oracle	Green	Download	⋮

Figura 128 – Pagina di “What If”

6.0.2.1 Scenario “What If”: Provider Migration

To perform a “What If: Migrate Provider” simulation, click on the box on the left titled “Migrate to another provider”.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Kubernetes, Security, Others, What If (which is highlighted), and Reports. Below the navigation bar, a breadcrumb trail shows 'Inventory / What If'. The main area has a dark background with white text. It asks 'What do you want to simulate today?' and provides two options: 'Migrate to another provider' (highlighted with a red box) and 'Change resources capacity'. Below these options, it says '... or take a look to a previous simulation:' followed by a table of past simulations. The table has columns for Name, Creation Date, Destination Providers, Status, Export, and Options. There are five entries, each with a green status icon and a download icon. The last entry shows 'Azure, Google' as destination providers. At the bottom right of the table, there are pagination controls.

Name	Creation Date	Destination Providers	Status	Export	Options
Multiple Provider Migration	06/06/2023 09:35	Azure	Green	Download	⋮
Multiple Provider Migration	06/06/2023 09:33	Azure	Green	Download	⋮
Multiple Provider Migration	06/06/2023 15:36	Azure	Green	Download	⋮
Multiple Provider Migration	06/06/2023 16:44	Google	Green	Download	⋮
Multiple Provider Migration	06/06/2023 16:43	Azure, Google	Green	Download	⋮

Figura 129 – Accesso alla funzionalità
"What If: Migrate Provider"

After doing so, the user will find themselves on the "Start" page of step 1 for simulating resource migration from one cloud provider to another.

On the left, in the "Select Resources to migrate" box, the user can search for resources using three types of filters, including:

- "Search" which allows searching for a resource by name;
- "Search by Type" to obtain resources by selecting the resource type;
- "Search by tags" which allows searching for resources using one or more tags.

Within the resource table, only resources that have a relationship in the catalog will be displayed.

Within the resource table, click on one of them and, using the "drag and drop" technique, drag it to the right, into the box titled "Currently selected".

A maximum of three resources can be included per simulation.

Subsequently, in the bottom right, click on the "Next" button.



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Figura 130 – Scelta delle risorse in cui effettuare la migrazione del provider

After doing so, the user will find themselves on the “Destination Providers” page of step 2, where it is possible to click on the checkbox corresponding to one or more providers. Based on the selected provider type, the value in the ‘Option selected’ field at the bottom left will be automatically populated with the names of the selected providers.

Subsequently, in the bottom right, click on the “Next” button, while to return to the “Start” page of step 1, click on the “Back” button.

Figura 131 – Scelta del Cloud Provider

in cui migrare le risorse

After clicking the “Next” button, the user will find themselves on the page of step 3 titled “Details”.

On this page, cards will be displayed, one for each subsystem selected in step 2.

In each card, on the left, there is a list of regions available for the cloud provider, and on the right, an empty section is displayed.

Selecting one or more regions in the right section (in red in the figure) will display a menu in the right section that allows selecting the type of cost to apply (in yellow in the figure). Selecting the “Consumption” type requires no further parameters, while selecting the “Reservation” type, to the left of the field, it will be possible to choose the Reservation period (in yellow in the figure).

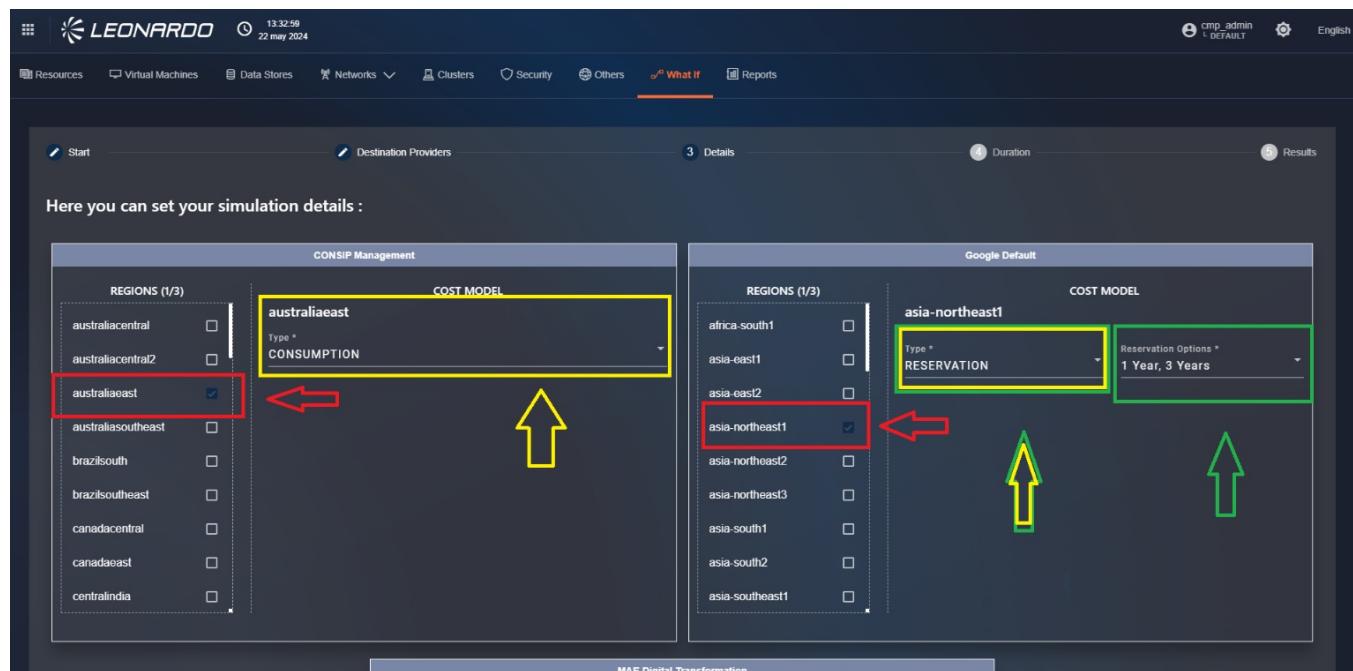


Figura 132 – Selezione della "Regione"
e del "Cost Model"

After clicking the “Next” button, the user will find themselves in step 4 titled “Duration”.

From the “Duration” page of step 4, select an interval for the simulation among:

- “One Month”
- “Six Months”
- “One Year”



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To return to the “Details” page, in the bottom right, click on the “Back” button. Instead, to proceed with the simulation, click on the “Launch Simulation” button.

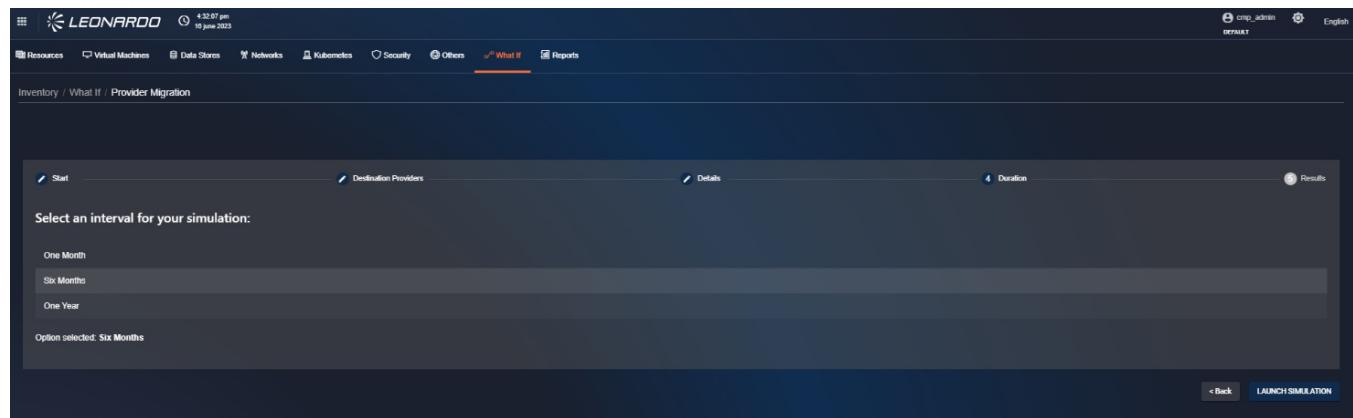


Figura 133 – Selezione dell’intervallo di tempo

After clicking the “Launch Simulation” button, the user will find themselves on the “Results” page of step 5.

Within the “Results” page, at the top, the “Simulation parameters” box can be viewed, which contains a summary of the parameters used. (in yellow in the figure)

Below the “Summary” box, there are different sections, one for each destination provider (in red in the figure), and inside, we can view the list of resources that can be migrated to the provider (in green in the figure). Clicking on one of them will display a histogram graph. In this graph we can note:

- A line parallel to the X-axis indicating the current cost of the resource.
- A series of bars (one for each region and selected cost type) that will be red when the destination price is higher than the starting price or green when the price is lower than the current cost of the resource; hovering over one of them will display its reference.
- A summary table of the selected cost types, which is used to generate the bar chart.

It is possible to view details for other simulations (in purple in the figure) using the procedure just described.

To exit the simulation without saving, in the bottom right, click on the “Close” button.

To save the simulation, click on the “Save” button next to the “Close” button, and then click on “Confirm”.

After clicking a button, the user is redirected to the “What If” tab page.



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Inventory / What If / Provider Migration

Start Destination Providers Details Duration 5 Results

Simulation parameters:

- Resources: VM-MONGO3-CMP (Azure), instance-1 (Google)
- Destination Providers: Google Default (Google), MAE CMP (Azure), MyOracle (Oracle)
- Duration: Six Months

Google Default

instance-1

VM-MONGO3-CMP

MAE CMP

MyOracle

Close Update

Figura 134 – Pagina dei risultati della simulazione WHAT IF



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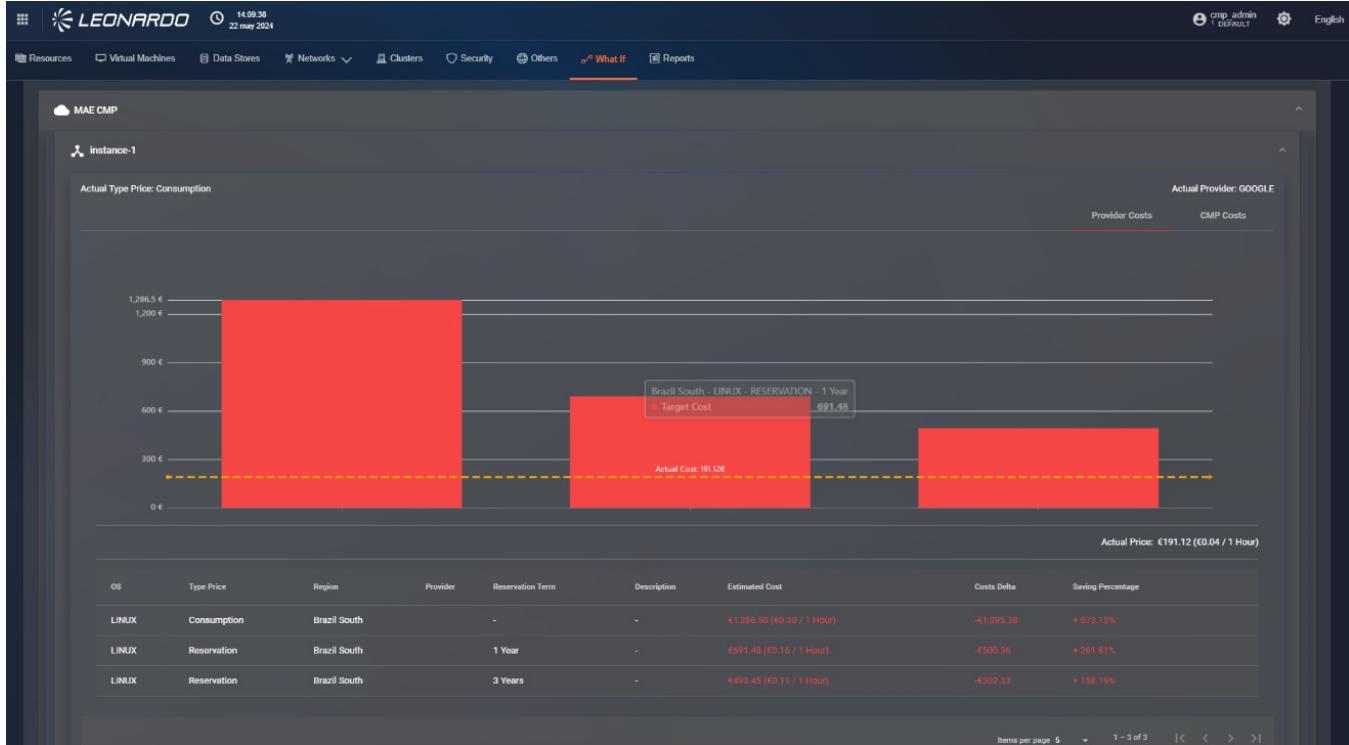


Figura 135 – Tabella riassuntiva della/e risorse

It is possible to update and re-run a simulation without re-entering all data.

To do this, click on the row to be modified. At this point, the user will be redirected to step 1 of the simulation, where all steps have been pre-filled using the saved parameters.



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Name	Creation Date	Destination Providers	Status	Export	Options
Multiple Provider Migration	16/06/2023 09:39	Azure	Green	Download	⋮
Multiple Provider Migration	16/06/2023 09:35	Azure	Green	Download	⋮
Multiple Provider Migration	16/06/2023 09:33	Azure	Green	Download	⋮
Multiple Provider Migration	14/06/2023 15:36	Azure	Green	Download	⋮
Multiple Provider Migration	06/06/2023 16:44	Google	Green	Download	⋮

Figura 136 – Avvio per l'aggiornamento
della simulazione di tipo "Migrate to
another provider"

6.0.2.2 Scenario “What If”: Change Resource Capacity

This functionality allows comparing the costs of a resource in case of modification of its technical characteristics.

Still from the “What If” tab page, in the top right, click on the “Change resources capacity” box.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there are two main buttons: 'Migrate to another provider' on the left and 'Change resources capacity' on the right, both enclosed in red boxes. Below these buttons, a message says "... or take a look to a previous simulation:". Underneath this message is a table titled 'Filter simulations' with two tabs: 'Provider Migration' (selected) and 'Capacity'. The table lists five previous simulations, each with columns for Name, Creation Date, Destination Providers, Status, Export, and Options. The 'Creation Date' column shows dates from June 16, 2023, at 16:39 to 18:44. The 'Destination Providers' column shows Azure for four entries and Google for one. The 'Status' column shows green circles with downward arrows. The 'Export' column has three entries with a download icon. The 'Options' column has three entries with a three-dot menu icon.

Name	Creation Date	Destination Providers	Status	Export	Options
Multiple Provider Migration	16/06/2023 16:39	Azure	Green circle with arrow	Download	⋮
Multiple Provider Migration	16/06/2023 09:35	Azure	Green circle with arrow	Download	⋮
Multiple Provider Migration	16/06/2023 09:33	Azure	Green circle with arrow	Download	⋮
Multiple Provider Migration	14/06/2023 15:36	Azure	Green circle with arrow	Download	⋮
Multiple Provider Migration	06/06/2023 18:44	Google	Green circle with arrow	Download	⋮

*Figura 137 – Accesso alla funzionalità
"What If: Change resources capacity"*

After doing so, the user will find themselves on the “Start” page of step 1.

On the left, in the “Select Resources to change” box, the user can search for resources using three types of filters, including:

- “Search” which allows searching for a resource by name;
- “Search by Type” which allows obtaining resources by selecting the resource type;
- “Search by tags” which allows searching for resources using one or more tags associated with them.

The resource table will only show resources that, within the SCMP catalog, have more than one “Relationship” with different sizes but belong to the same region, price type, and operating system.

In the bottom left, there is the resource table, which can be filtered based on the parameters entered in the filter(s). Within the resource table, click on one of them and, using the “drag and drop” technique, drag it to the right, into the box titled “Currently selected:”.

A maximum of three resources can be included per simulation.

Subsequently, in the bottom right, click on the “Next” button.



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Figura 138 – Selezione delle risorse da cui modificare le capacità

After doing so, the user will find themselves on the “Resource Provider” page of step 2, where it is possible to modify the size of one or more resources.

Within the “Resource Provider” page of step 2, for a resource, click on the dropdown menu in the “Size” column and select a different size from the initial one.

After that, in the bottom right, click on the “Next” button to continue the simulation.

To return to the “Start” page of step 1, click on the “Back” button.



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Figura 139 – Modifica della size di una risorsa

After clicking the “Next” button, the user will find themselves on the “Duration” page of step 3.

Within the aforementioned page, it is necessary to select an interval for the simulation.

After that, in the bottom right, click on the “Launch Simulation” button.

To go back, click on the “Back” button; in this way, the user will find themselves on the “Resource Provider” page of step 2.

The screenshot shows a web-based interface for managing cloud resources. At the top, there's a navigation bar with the Leonardo logo and some administrative details. Below the header, a breadcrumb trail indicates the current location: Inventory / What If / Resource Change. The main content area is titled "Duration". It features a sidebar on the left with options like "Start", "Resource Provider", and "Duration". The main panel contains a section for selecting a simulation interval, with "Six Months" highlighted. At the bottom right of the main panel, there's a prominent blue button labeled "LAUNCH SIMULATION".

Figura 140 – Selezione dell'intervallo per la simulazione

After clicking the “Launch Simulation” button, the user will find themselves on the “Results” page of step 4.

Within the “Results” page, at the top, there is a “Summary” box that advises whether to modify the size of the resources. Below, there is an histogram graph, where the purple bar represents current costs, while the green bar represents target costs.

To save the simulation, click on the “Save” button next to the “Close” button, and then click on “Confirm”. After doing so, the user is redirected to the “What If” page.

To exit the simulation without saving it, in the bottom right, click on the “Close” button. After doing so, the user will find themselves on the “What If” page.



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Simulation parameters:

- Resources: vm-default (AmazonWebServices/miida-database-vm (Azure))
- Destination Providers: Azure Default (Azure)
- Destination Providers Region: uscentral
- Destination Providers Cost: CONSUMPTION
- Duration: One Year

Summary:

Moving these 2 resources to these providers you would lose -199.99% (-1549.13€) compared to the actual costs.
ADVICE: It's suggested to remain with actual provider.

Details:

Selected Resources

Resource	Actual Cost	Target Cost
miida-database-vm	~1000€	~1500€
VM-PGP-Class	~1000€	~1500€
vm-default	~1000€	~1500€

miida-database-vm

Actual Provider	Actual Type	Actual Price	Consumption	Actual Provider	Actual Type	Actual Price
AZURE	LINUX	Consumption	West Europe	AZURE	LINUX	Consumption

VM-PGP-Class

Actual Provider	Actual Type	Actual Price	Consumption	Actual Provider	Actual Type	Actual Price
AZURE	LINUX	Consumption	West Europe	AZURE	LINUX	Consumption

Figura 141 – Parametri di configurazione e consiglio sulla simulazione

6.0.2.3 What If scenario Export

For a simulation of a resource size modification, it is possible to export it in PDF, CSV, and JSON format.

Within the “What If” page, at the bottom, there is a table of simulations; click on the “Capacity” button located in the top right corner of the aforementioned table.

After doing so, the table shows simulations regarding resource size modification.



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For a simulation, click on the button depicting an arrow.

At this point, a sub-menu will open where it is possible to export in the three previously described formats.

The screenshot shows a web-based management interface for Leonardo's Secure Cloud Management Platform. At the top, there are several navigation tabs: Resources, Virtual Machines, Data Stores, Networks, Kubespaces, Security, Others, What If (which is currently selected), and Reports. On the right side of the header, there are user authentication details (mp_admin) and language selection (English). Below the header, there are two large buttons: "Migrate to another provider" (with a circular arrow icon) and "Change resources capacity" (with a bar chart icon). In the center, there is a message "... or take a look to a previous simulation:". Below this message, a table lists five previous simulations, each with a status column (green circle), a creation date, a duration, and a kebab menu icon. To the right of the table is a "Filter simulations" dropdown set to "Provider Migration" and a "Capacity" button. A red box highlights the kebab menu icon for the first simulation row, and a red arrow points from this box to the "Print" option in the dropdown menu, which is also highlighted with a red box. The bottom right corner of the interface shows pagination controls (Items per page: 5, 1 - 5 of 10).

Figura 142 – Export della simulazione

Also for a simulation, it is possible to print it.

For a simulation, click on the kebab menu, and then click on the “Print” option.

At this point, a modal of the print preview will appear. Finally, click on the “Print” button to start printing the document.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there are two large buttons: "Migrate to another provider" and "Change resources capacity". Below them, a section titled "... or take a look to a previous simulation:" displays a table of past simulations. The table has columns for Name, Creation Date, Duration, Status, Export, and Options. A red box highlights the "Capacity" filter button at the top right of the table. Another red box highlights the "Delete" option in the kebab menu for the first simulation row.

Name	Creation Date	Duration	Status	Export	Options
Resource Migration	19/09/2023 17:19	Six Months	Green	+	⋮
Resource Migration	14/09/2023 15:39	Six Months	Green	+	⋮
Resource Migration	14/09/2023 15:39	Six Months	Green	+	⋮
Resource Migration	3/09/2023 12:55	One Year	Green	+	⋮
Resource Migration	3/09/2023 04:27	Six Months	Green	+	⋮

Figura 143 – Stampa della simulazione

For a simulation, click on the kebab menu.

From the list of options, click on “Delete”.

This screenshot is identical to the one above, showing the list of previous simulations. The red box around the "Delete" option in the kebab menu for the first simulation row is now highlighted, indicating it has been selected.



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Figura 144 – Opzione per eliminare una simulazione

After clicking the “Delete” option, a modal will appear where it is necessary to confirm the deletion of the simulation by clicking on the “Confirm” button.

After doing so, the simulation is no longer present in the table.

If, however, you do not want to confirm the deletion of the simulation, click on the “Cancel” button.

Name	Creation Date	Duration	Status	Export	Options
Resource Migration	19/06/2023 17:19	Six Months	Green	Up	⋮
Resource Migration	14/06/2023 15:30	Six Months	Green	Up	⋮
Resource Migration	14/06/2023 15:30	Six Months	Green	Up	⋮
Resource Migration	30/05/2023 12:55	One Year	Green	Up	⋮
Resource Migration	30/05/2023 04:27	Six Months	Green	Up	⋮

Figura 145 – Conferma dell'eliminazione della simulazione

6.0.3 Reporting Tools

The reporting functionality, specific to features, allows generating global reports of the information available for the various providers. Within the pages, there will also be the possibility to create files to facilitate information sharing.

To access the functionality, above the breadcrumb path, click on the “Reports” tab.

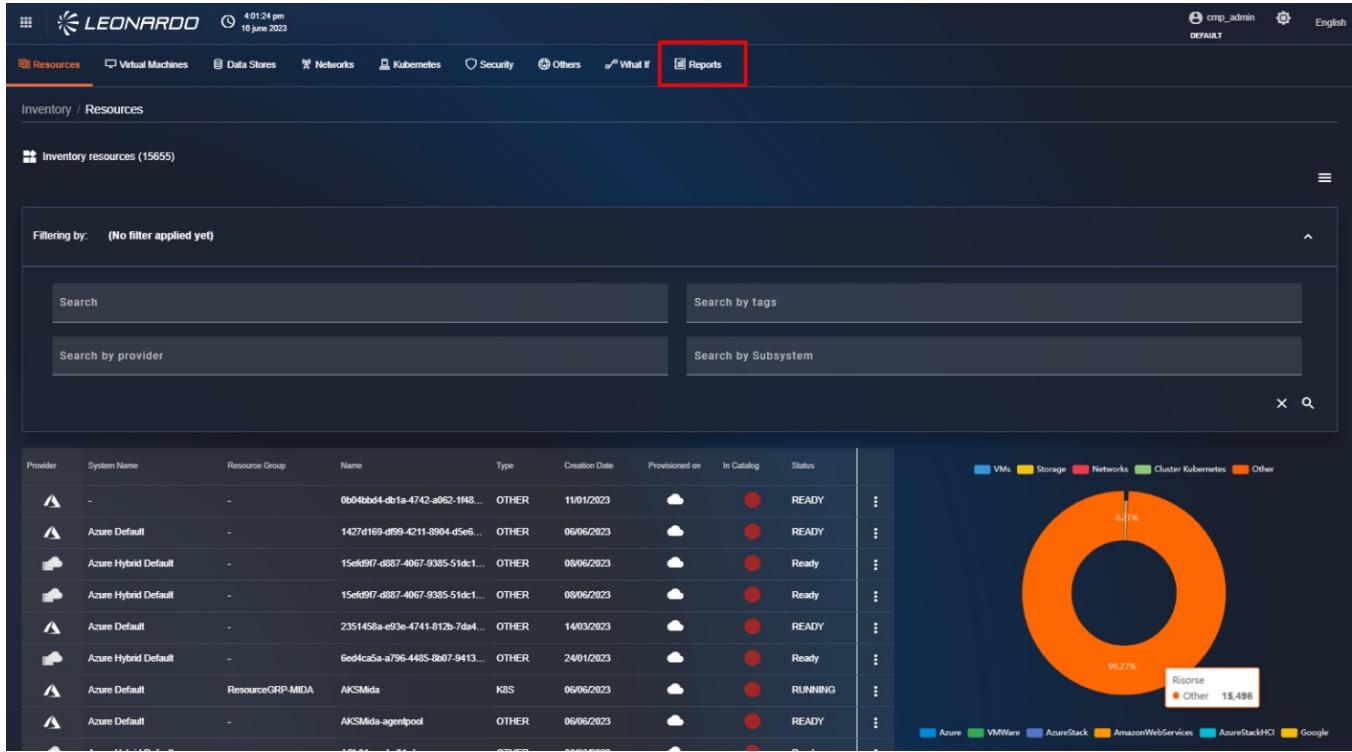


Figura 146 – Accesso al report di Catalogo

6.0.3.1 Available report types

- INVENTORY Summary** – Summary on the quantity of main inventory resources based on the selected provider/subsystem combination.

6.0.3.2 Report Creation

At the top right of the page, we can click on the “New Report” button to start creating a report. Specifically, a modal is displayed containing the list of available report types.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is currently selected. Below the navigation, there's a breadcrumb trail: Inventory / Reports. The main area is titled 'Reports' and shows a table of existing reports. The table has columns for Sub Category, Provider, Creation Date, Status, and Actions. There are 12 entries listed, all in the 'READY' status. A modal window titled 'New report' is overlaid on the page. It contains a sub-header 'New report' with a small icon, followed by the instruction 'Select a report type from the list'. Below this is a list item 'Inventory Summary' with the description 'Report about the number of resources related to specific filters'. At the bottom of the modal are two buttons: 'Cancel' and 'Configure'.

Figura 147 – Creazione nuovo report

Once the report type is selected, click on the “Configure” button to select the providers to include in the report. In the newly opened window, we find the “Provider” field which allows selecting one or more pre-existing providers in the system. Subsequently, it is possible to select one or more subsystems to include in the report; if no providers are selected, no subsystem can be selected. Finally, there is a “tag” section to include only resources that have the entered tag.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is currently selected. Below the navigation bar, there's a sub-navigation for Inventory / Reports. A modal dialog box titled "Inventory" is open, showing settings for a report. The provider is set to "Azure, Google" and the subsystem is "MAE LAB, CMPPROJECT-374610". The report type is set to "One-Shot". A "Submit" button is at the bottom of the dialog. In the background, there's a table listing various reports with columns for Status (all listed as READY) and Actions (three-dot menu icons). The table includes rows for different providers like AZURE, AZURE, GOOGLE, OPENSHIFT, and AZURE, GOOGLE, KUBERNETES, OPENSHIFT, along with their respective creation dates and times.

Figura 148 – Configurazione del report

At this point, the user can choose between two different actions:

- Create a static report that will be saved in the system.
- Schedule a task that generates the report periodically.

To confirm the creation of a static report, verify that “One-Shot” has been selected for the “Report type” field and click the “Submit” button at the bottom.

After a loading period, the newly generated report will be visible in the list.

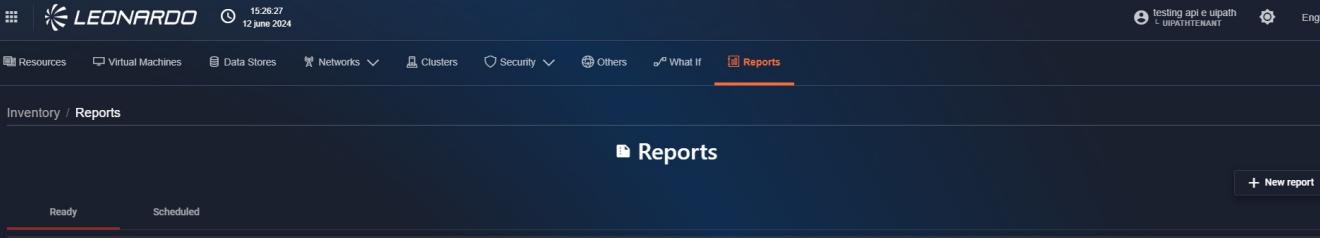


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The screenshot shows the Leonardo Cloud Platform interface. At the top, there's a header bar with the Leonardo logo, a timestamp (15:26:27, 12 June 2024), and user information (testing api e upath). Below the header is a navigation bar with links: Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports (which is highlighted with an orange underline). The main content area has a dark blue header with the title "Reports". Underneath, there are two tabs: "Ready" (selected) and "Scheduled". A button "+ New report" is located in the top right of this header. The main body contains a table with columns: Sub Category, Provider, Creation Date, Status, and Actions. The table lists 12 rows, all of which are "READY" and have three dots in the Actions column. The Sub Category values are mostly "SUMMARY" except for one row which is "AZURE, GOOGLE, OPENSHIFT".

Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 1:21 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮

Figura 149 – Lista dei report effettuati

6.0.3.2.1 REPORT SCHEDULING

If, instead, you want to schedule automatic report execution, it will be necessary to select “Recurring” for the “Report Type” field. In this case, the window refreshes to show additional parameters for configuring the periodic report.

The parameters to enter are:

- Period: allows selecting the report sending frequency (hourly, daily, ...).
 - "Receive only if not empty" if selected, the file will not be sent when it contains no information.
 - Report Language: allows selecting the language used in the report.
 - File format: allows selecting one or more file types to include in the email.
 - User E-mails: allows entering an email address to send reports to. After entering an email, it is necessary to press "Enter" on the keyboard to confirm its insertion. Once pressed, the newly entered email will move to the box at the bottom, and the field will be cleared to allow the insertion of a new email, if necessary.



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Secure Cloud Management Platform

The screenshot shows the Leonardo Cloud Management Platform interface. At the top, there's a navigation bar with icons for Home, Dashboard, DashboardCustomer, Virtual Machines, Data Stores, Clusters, Networking, Security, Usages, Reports, and a search bar. The date and time (15:16:35, 04 June 2025) are also displayed. On the left, a sidebar titled 'Costs / Reports' lists categories like FINOPS COST, DETAILS GROUP RESOURCE, DETAILS, SUMMARY GROUP RESOURCE, SUMMARY, FINOPS COST, FINOPS COST, FINOPS COST, and SUMMARY. Below this, two tabs are visible: 'Ready' (which is selected) and 'Scheduled'. A modal window titled 'Costs' is open in the center, specifically the 'Tags' section. It contains fields for 'Report Type' (set to 'Recurring'), 'Period' (set to 'Costs Summary - Group By Resource'), 'Report's language' (set to 'English'), 'File format' (set to 'Costs Details - Group By Resource'), and 'User E-mails' (containing 'FinOps Report'). A message at the bottom of the modal says 'Press ENTER for each email you want to confirm and add to the list of recipients. It's possible to add multiple emails.' To the right of the modal, a table lists various resources with columns for 'Status' (all are 'READY') and 'Actions' (represented by three vertical dots). Each row corresponds to one of the listed categories in the sidebar.

*Figura 150 – Parametri dei report
schedulati*

Having configured all parameters, the “Submit” button will become clickable. Click it to confirm the insertion, and after a loading period, the newly generated report will be visible in the list.

	LEONARDO	15:26:27 12 June 2024	testing api e ipath L UPATHENTAN	English
	Resources		Virtual Machines	
	Networks		Clusters	
	Others		What If	
				Reports

Inventory / Reports

Reports

+ New report

Ready	Scheduled			
Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 12:11 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	06/06/2024 - 12:29 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮



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Figura 151 – Lista dei report effettuati

6.0.3.2.2 LIST OF SCHEDULED REPORTS

To view the list of scheduled reports, select the “Scheduled” tab at the top left of the reports page.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with various icons and links like 'Resources', 'Virtual Machines', 'Data Stores', 'Networks', 'Clusters', 'Security', 'Others', 'What If', and 'Reports'. The 'Reports' link is underlined in orange. Below the navigation, the title 'Inventory / Reports' is followed by 'Reports' in bold. On the left, there are tabs for 'Ready' and 'Scheduled', with 'Scheduled' being highlighted by a red box and a red arrow pointing to it. The main area displays a table with columns: Period (Hourly), Language (EN), Recipients (noame@gmail.com), and Last sent (12/06/2024 - 1:21 PM). At the bottom right of the table, there are pagination controls for 'Items per page' (20), 'Page' (1-1 of 1), and navigation arrows.

Figura 152 – Lista dei report schedulati

On this page, you will find the list and related information of scheduled reports present in the system. For each result, by clicking the “Three dots” button on the right, three operations can be performed:

- View the last generated report.
- Edit the schedule settings; it will not be possible to modify the selected providers or subsystems.
- Delete the schedule to stop sending emails.



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Secure Cloud Management Platform

Figura 153 – Modifica di una schedule

6.0.3.2.3 USING REPORTS

By clicking on a static report row, or using the “Show report” button available for scheduled reports, it will be possible to view the detail page of the selected report.

Within the Inventory report summary, there is a “Stats” section showing the number of disks, interfaces, networks, and virtual machines belonging to the selected provider.

Below the “Stats” section, the filters used by the user to generate the report are present.

Below the filters, there is a summary table of resources belonging to the providers. On the right, there are two buttons: “PRINT” and “EXPORT”.

Clicking on the “PRINT” button, a print preview modal appears. To print the report, click on the “Print” button in the bottom right; at this point, the printing of the report will start.

Clicking on the “EXPORT” button, it is possible to export the report in “.csv”, “.json”, or “.pdf” format.

To return to the “Results” tab, in the bottom right, click on the “CLOSE” button or in the top left, click on the left-pointing arrow, next to the report title.



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Secure Cloud Management Platform

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is underlined, indicating it's the active section. Below the navigation is a breadcrumb trail: Inventory / Reports / Report 6669a0d3aae316468b3c8b34. The main content area is titled "Report Inventory Summary". It features a "Stats" section with five boxes: 1 VMs, 1 Disks, 1 Networks, 0 Interfaces, and 0 K8Ss. Below this is a table titled "PROVIDER: AZURE, GOOGLE | SUBSYSTEM: MAE LAB,CMPPROJECT-374610". The table has columns for Type Provider, Subsystem Name, VMs, Disks, Networks, Interfaces, and K8Ss. It lists two entries: Azure (MAE LAB) with 14 VMs, 16 Disks, 14 Networks, 0 Interfaces, and 0 K8Ss; and Google (CMPPROJECT-374610) with 1 VM, 1 Disk, 1 Network, 0 Interfaces, and 0 K8Ss. At the bottom right of the table are buttons for "PRINT" and "EXPORT".

Type Provider	Subsystem Name	VMs	Disks	Networks	Interfaces	K8Ss
Azure	MAE LAB	14	16	14	0	0
Google	CMPPROJECT-374610	1	1	1	0	0

Figura 154 – Dettagli dei report

7 Monitoring

The SCMP collects metrics from all cloud providers and aggregates them by macro categories.

This aggregation allows comparison between metrics from different providers.

By accessing the dashboard, we can see how this aggregation mechanism provides an overview of resource utilization, divided by provider and organized by associated resource type.

Within the functionality, it is possible to filter by resource type using the tab bar at the top, while for a general view, the dashboard can be used.

The monitoring module can be accessed via the dedicated menu. As shown in the figure:



Figura 155 – Access to the Monitoring Module

7.0.1 Monitoring Dashboard

At this point, the user will be on the "Dashboard" monitoring tab page.



Figura 156 – Monitoring Dashboard

7.0.1.1 Monitoring Section Filters

Within the page, a series of filters are available that can be selected simultaneously to filter the dashboard results.

The main filter is the display period, which can be found at the top right. Clicking on it will open a selection window (in yellow in the figure) where it will be possible to either enter a customized time range, using the "From" and "To" fields on the left, or select a "Smart" time range by directly clicking on the desired choice in the scrollable section on the right.

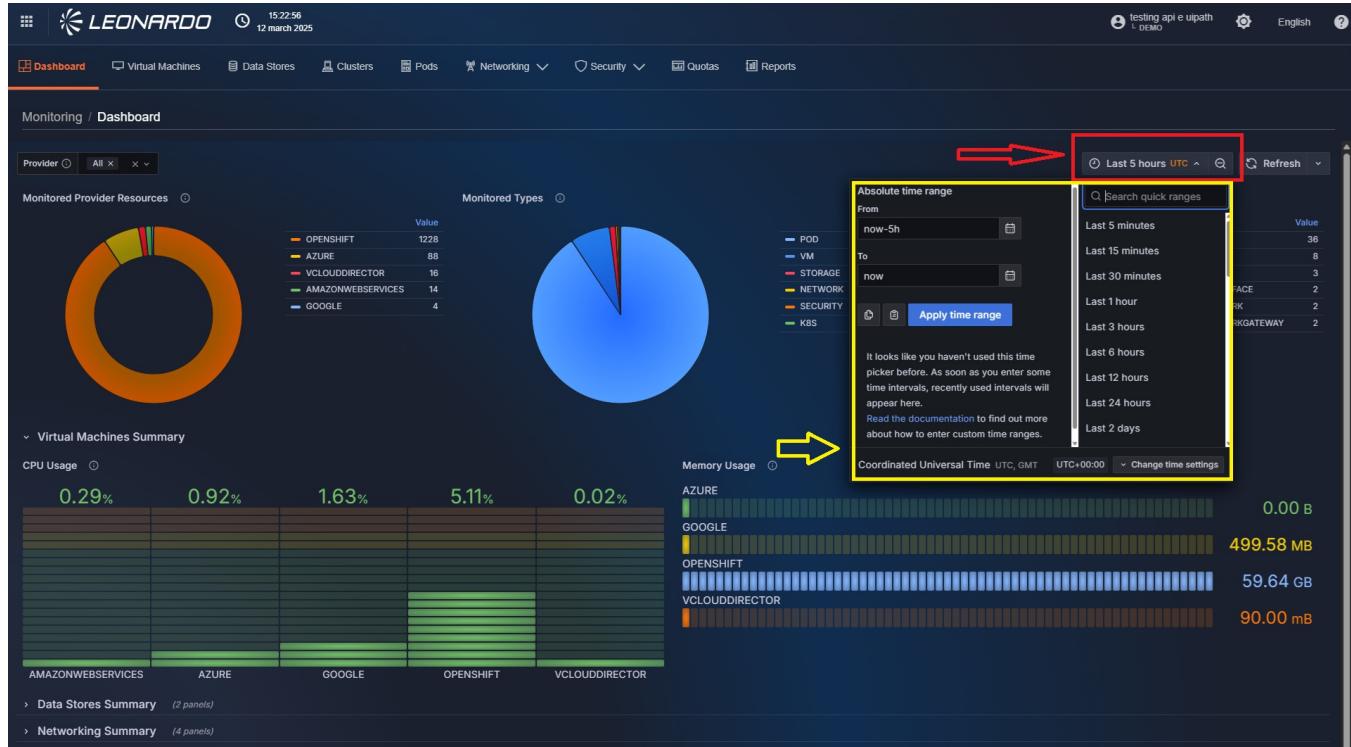


Figura 157 – Monitoring Time Filter

Additionally, a series of filters are available at the top left of the page, allowing users to filter the retrieved resources. Specifically, it is possible to filter by:

- Provider type
- Subsystem name.
- Resource name (only in detailed dashboards)

These filters allow for multiple values to be selected and can be combined to achieve the desired granularity.



Figura 158 – Monitoring Functionality

Filters

7.0.2 Quotas Dashboard

The Quotas dashboard, available in the "Quotas" tab, allows viewing the details of consumption and related limits applied to Vcloud type subsystems.

To access it, you need to click the button at the top of the tab bar.

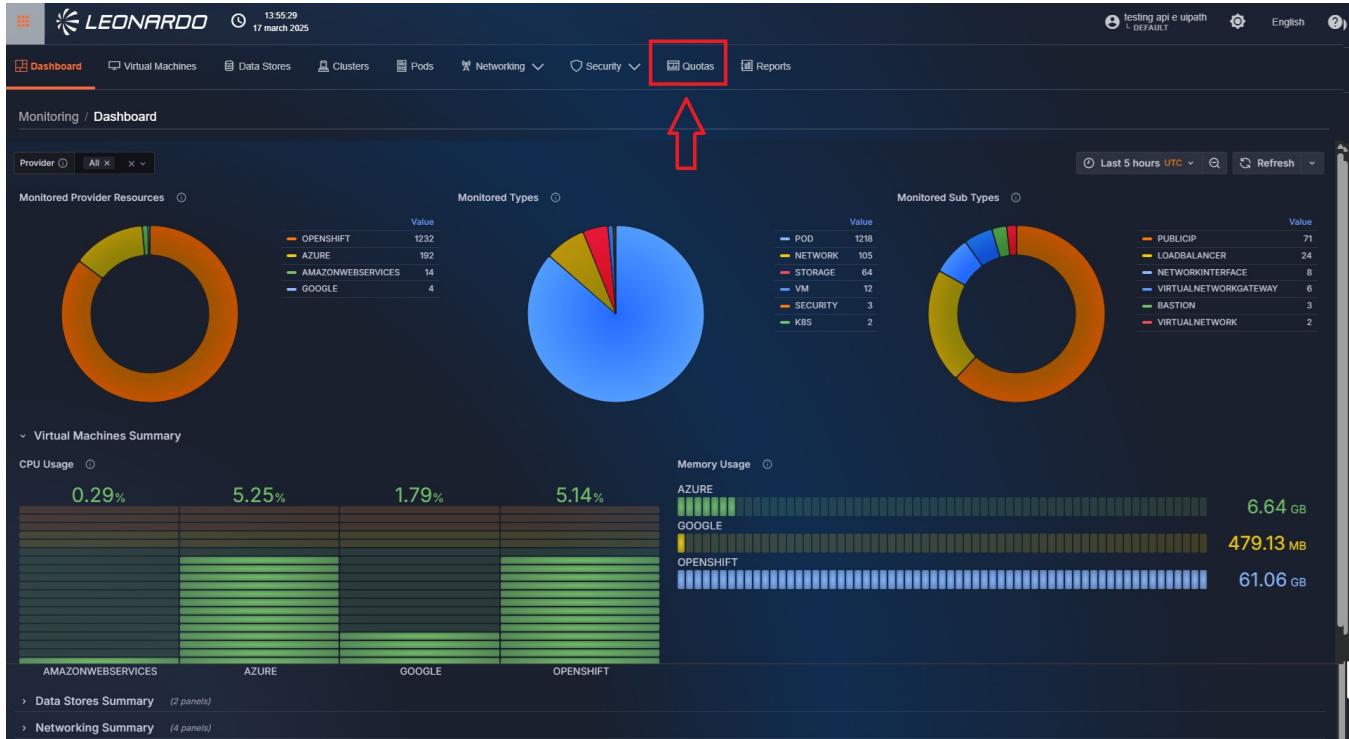


Figura 159 – Access to the Quotas section

At this point, the user will be on the "Quotas" monitoring tab page. At the top, we can see a filter bar, which allows filtering by provider or subsystem. Additionally, it is possible to view the filters for the chart using the "Show additional filters" button; these filters modify the chart's display. Below the filters, there is a table indicating the subsystem name and the quotas used, limits, and an average utilization divided by resource type. Finally, at the bottom, a time-based chart on the selected metric in the filters can be displayed.



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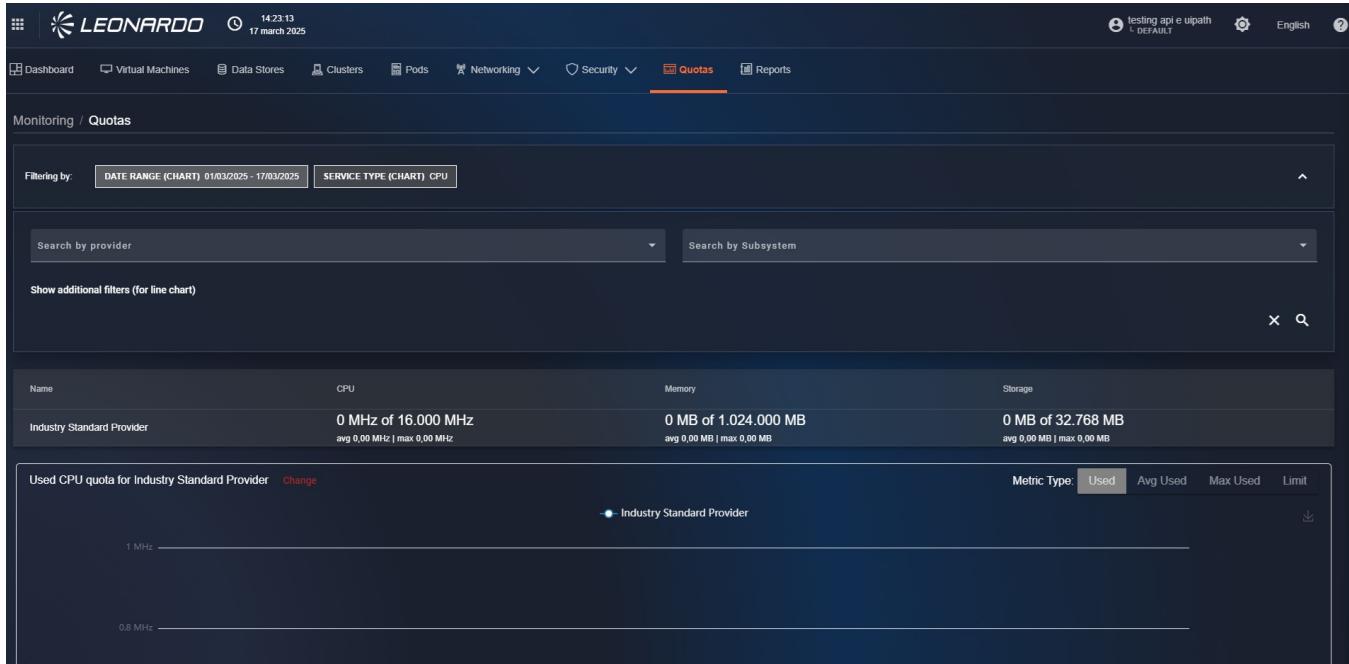


Figura 160 – Quotas Dashboard

7.0.3 Alarms on Quota Usage

To allow the user to receive notifications when quota usage thresholds are exceeded, an "Alerting" module has been included. To access it, you need to select the tab at the top of the Monitoring functionality.

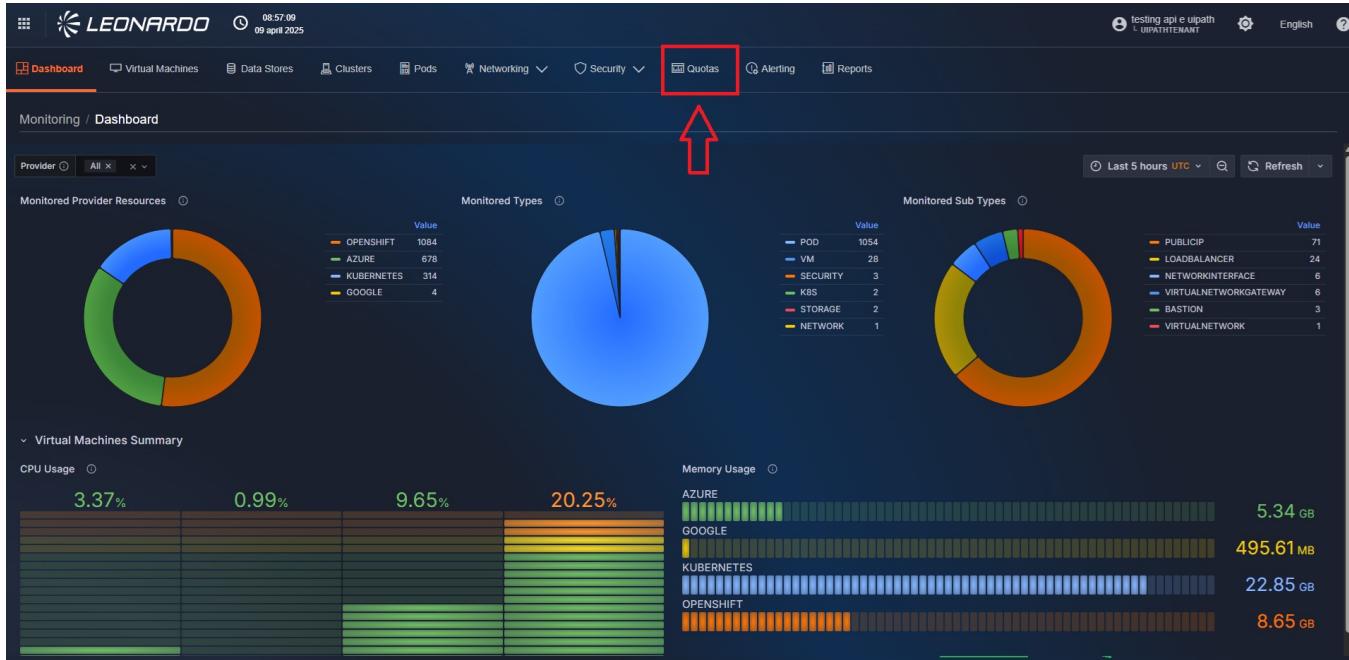


Figura 161 – Access to the Alerting system

Within the page, we find the list of "alerts" configured on the system, along with their respective configurations.

7.0.3.1 New Alert Creation

Using the menu available on the right, it is possible to add a new alert to the system. To do this, we select the displayed "New alert" option, and a configuration page will open.



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The screenshot shows the Leonardo Secure Cloud Management Platform's Alerting section. At the top, there are navigation links: Dashboard, Virtual Machines, Data Stores, Clusters, Pods, Networking, Security, Quotas, Alerting (which is highlighted in orange), and Reports. Below this, a breadcrumb trail reads 'Monitoring / Active alert rules'. The main area displays a table titled 'Active alert rules' with two rows of data. The columns are: Alert Schedule, Alert Type, Alert Send Type, and Creation Date. The first row has 'Daily' as the schedule, 'Quota' as the type, 'Email' as the send type, and a creation date of '27/03/2025 16:45:00'. The second row has 'Weekly' as the schedule, 'Quota' as the type, 'Email' as the send type, and a creation date of '04/04/2025 14:24:08'. In the bottom right corner of the table area, there is a green box highlighting a red-bordered button labeled '+ New rule'.

Figura 162 – New Alert Creation

On the configuration page, all fields must be filled in, specifically:

- **"Alert type"**: Select the alert type
- **"Alert schedule"**: Indicates the frequency of checks to be performed
- **"Quota type"**: Select the quota type to monitor
- **"Threshold (%)"**: Enter the percentage beyond which the alert will be sent.
- **"Subsystems"**: Select one or more subsystems to monitor
- **"Alert send type"**: Select the type of alert to receive, via e-Mail or Rabbit queue (for automatic integration with other systems)
- **"Alert format"**: Select the format of the sent file that defines the alert details.
- **"Emails"**: By selecting E-mail as the notification type, we can enter an email address to send reports to. After entering an email, it is necessary to press "Enter" on the keyboard to confirm its entry. Once pressed, the newly entered email will move to the box at the bottom, and the field will be cleared to allow for the entry of a new email, if necessary.



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The screenshot shows a dark-themed web interface for managing alerts. At the top, there's a navigation bar with links like Dashboard, Virtual Machines, Data Stores, Clusters, Pods, Networking, Security, Quotas, Alerting (which is highlighted in red), and Reports. Below the navigation, a sub-menu for 'Alerting' is open, showing 'New Rule'. The main area contains a form with the following fields:

- Alert configuration**
- Alert Type:** Quota
- Alert Schedule:** Daily
- Quota Type:** Memory
- Threshold (%):** 75
- Subsystems:** Industry Standard Provider
- Alert Send Type:** Email
- Alert Format:** CSV
- Emails:** A text input field with placeholder text: "Press ENTER for each email you want to confirm and add to the list of recipients. It's possible to add multiple emails."

At the bottom right of the configuration panel, there are "Cancel" and "Add" buttons.

Figura 163 – Configuration Page

7.0.3.2 Viewing, Modifying, and Deleting an Alert

On this page, we find the list and related information of the alerts present in the system. For each result, by clicking the "Three dots" button on the right, it will be possible to perform three operations:

- View the "alert" configuration
- Edit the alert settings.
- Delete the schedule to stop sending emails.



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Alert Schedule	Alert Type	Alert Send Type	Creation Date	Actions
Daily	Quota	Email	27/03/2025 16:45:00	
Weekly	Quota	Email	04/04/2025 14:24:08	

Figura 164 – Alert Operations

7.0.4 Reporting Tools

The reporting functionality, specific to each feature, allows generating global reports of the information available for the various providers. Within the pages, the possibility will also be given to create files to facilitate information sharing. To access the functionality, above the breadcrumb path, click on the "Reports" tab.

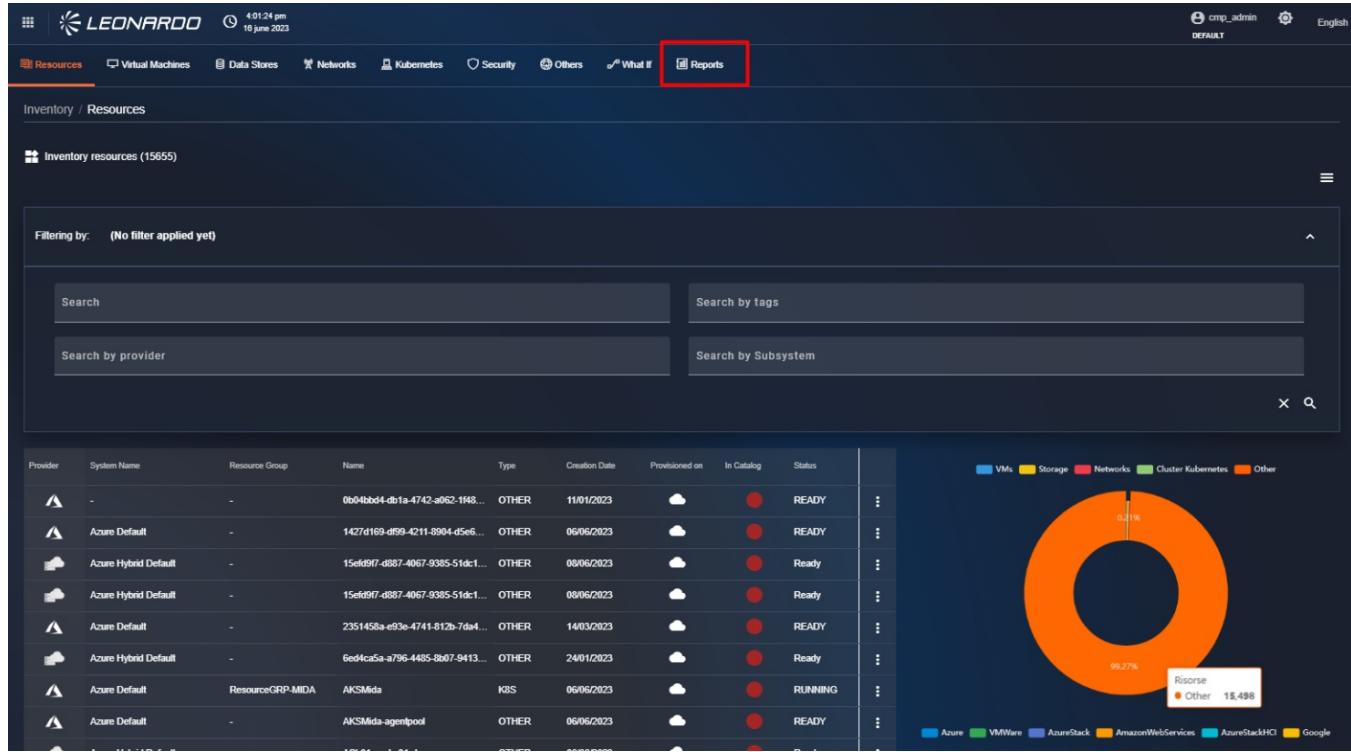


Figura 165 – Access to Catalog Report

7.0.4.1 Available Report Types

- Monitoring Threshold Quotas** – List of VCloud and/or Backup subsystems, integrated into the SCMP, with details of utilization quotas (CPU, Memory, Storage, Backup). Based on the selected filter combination, it is possible to filter subsystems that exceed a certain utilization threshold.

7.0.4.2 Report Creation

At the top right of the page, we can click the "New Report" button to start creating a report. Specifically, a modal is displayed containing the list of available report types.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is currently selected. Below the navigation, there's a breadcrumb trail: Inventory / Reports. The main area displays a table of reports categorized as Ready or Scheduled. One specific report entry for 'Inventory Summary' is highlighted. A modal window titled 'New report' is overlaid on the page, asking the user to 'Select a report type from the list'. Inside the modal, 'Inventory Summary' is listed with the sub-instruction 'Report about the number of resources related to specific filters'. At the bottom of the modal are 'Cancel' and 'Configure' buttons.

Figura 166 – New Report Creation

Once the report type is selected, click the "Configure" button to select the providers to include in the report. In the newly opened window, we find the "Provider" field which allows selecting one or more pre-existing providers in the system. Subsequently, it is possible to select one or more subsystems to include in the report; if no providers are selected, no subsystems can be selected. Finally, there is a "tag" section to include only resources that have the entered tag.



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Secure Cloud Management Platform

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is currently selected. Below the navigation bar, there's a sub-menu for Inventory / Reports. A modal dialog box titled "Reports" is open in the center. The dialog has tabs for "Ready" (selected) and "Scheduled". Under "Ready", there's a table with columns for Sub Category, Provider, and Status. The table lists several entries, all of which are marked as "READY". On the right side of the dialog, there's a form for creating a new report. It includes fields for Provider (set to "Azure, Google"), Subsystem (set to "MAE LAB, CMPPROJECT-374610"), Tags, and Report Type (with "One-Shot" selected). A "Submit" button is at the bottom of the form. The background of the main interface shows a list of reports with columns for Date, Status, and Actions.

Figura 167 – Report Configuration

At this point, the user can choose between two different actions:

- Create a static report that will be saved in the system.
- Schedule a job that generates the report periodically.

To confirm the creation of a static report, verify that "One-Shot" has been selected for the "Report type" field and click the "Submit" button at the bottom. After a loading period, the newly generated report will be visible in the list.



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Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 1:21 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	06/06/2024 - 12:29 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮
SUMMARY		04/06/2024 - 12:29 AM	READY	⋮

Figura 168 – List of Generated Reports

7.0.4.2.1 REPORT SCHEDULING

If, on the other hand, automatic report execution is desired, it will be necessary to select "Recurring" for the "Report Type" field. In this case, the window updates to show additional parameters for configuring the periodic report. The parameters to enter are:

- Period: allows selecting the report sending frequency (hourly, daily, ...).
- "Receive only if not empty": if selected, the file will not be sent when it contains no information.
- Report Language: allows selecting the language used in the report.
- File format: allows selecting one or more file types to include in the email.
- User E-mails: allows entering an email address to send reports to. After entering an email, it is necessary to press "Enter" on the keyboard to confirm its entry. Once pressed, the newly entered email will move to the box at the bottom, and the field will be cleared to allow for the entry of a new email, if necessary.



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	Status	Actions	Creation Date	Last Run
0.00	READY	...	15/04/2025	15/04/2025 17:00
0.47	READY	...	15/04/2025	15/04/2025 17:00
0.46	READY	...	15/04/2025	15/04/2025 17:00
0.45	READY	...	15/04/2025	15/04/2025 17:00
0.44	READY	...	15/04/2025	15/04/2025 17:00
0.26	READY	...	15/04/2025	15/04/2025 17:00
0.12	READY	...	15/04/2025	15/04/2025 17:00
0.47	READY	...	15/04/2025	15/04/2025 17:00
0.34	READY	...	15/04/2025	15/04/2025 17:00
0.26	READY	...	15/04/2025	15/04/2025 17:00
0.47	READY	...	15/04/2025	15/04/2025 17:00

Figura 169 – Scheduled Report Parameters

Having configured all parameters, the "Submit" button will become clickable. Click it to confirm the entry, and after a loading period, the newly generated report will be visible in the list.

Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 1:21 PM	READY	...
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	...
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	06/06/2024 - 12:29 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	...



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Secure Cloud Management Platform

Figura 170 – List of Generated Reports

7.0.4.2.2 LIST OF SCHEDULED REPORTS

To view the list of scheduled reports, select the "Scheduled" tab located at the top left of the reports page.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with various links like Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is underlined in orange. Below the navigation, there's a sub-menu for Inventory / Reports. On the right, there's a large 'Reports' section with a header 'Reports'. Underneath, there are two tabs: 'Ready' and 'Scheduled', with 'Scheduled' being the active one and highlighted with a red box. To the right of the tabs are filters for Period (Hourly), Language (EN), and Recipients (noame@gmail.com). Below these filters, there's a table with one row showing the last send time as 12/06/2024 - 1:21 PM. At the bottom right of the table, there are pagination controls for items per page (20) and a total count of 1. There's also a 'New report' button and a three-dot menu icon.

Figura 171 – List of Scheduled Reports

On this page, we find the list and related information of the scheduled reports present in the system. For each result, by clicking the "Three dots" button on the right, it will be possible to perform three operations:

- View the last generated report.
- Edit the schedule settings; it will not be possible to modify the selected providers or subsystems.
- Delete the schedule to stop sending emails.



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Secure Cloud Management Platform

The screenshot shows a dark-themed web interface for managing cloud resources. At the top, there's a navigation bar with links like Dashboard, Customer, Virtual Machines, Data Stores, Clusters, Networking, Security, Usages, and Reports. The Reports tab is currently selected. Below the navigation, there's a breadcrumb trail: Costs / Reports. On the left, there's a sidebar with tabs for Ready and Scheduled, and sections for Period (Weekly), Language (EN), and Recipients (info.giammarco@gmail.com). A modal window titled 'Edit schedule options' is open in the center. It has a 'Period' dropdown set to 'Weekly'. There are checkboxes for 'Receive only if not empty' and 'Report's language' (set to English). Under 'File format', it says 'CSV, JSON'. In the 'User E-mails' section, 'info.giammarco@gmail.com' is listed. At the bottom of the modal is a 'Save' button. To the right of the modal, there's a table with columns for Actions, showing one row with a 'Show Report' link, an edit icon, and a delete icon. The table also includes filters for 'Items per page' (20) and '1 - 1 of 1'.

Figura 172 – Modify a schedule

7.0.4.2.3 REPORT USAGE

By clicking on a static report row, or by using the "Show report" button available for scheduled reports, it will be possible to view the detail page of the selected report. Within the Inventory report summary, there is a "Stats" section which includes the number of disks, interfaces, networks, and virtual machines belonging to the selected provider. Below the "Stats" section, there are the filters used by the user to generate the report. Below the filters, there is a summary table of resources belonging to the providers. On the right, there are two buttons: "PRINT" and "EXPORT". Clicking the "PRINT" button will display a print preview modal. To print the report, click the "Print" button at the bottom right; at this point, the printing of the report will start. Clicking the "EXPORT" button allows exporting the report in ".csv", ".json", or ".pdf" format. To return to the "Results" tab, click the "CLOSE" button at the bottom right, or click the left-pointing arrow at the top left, next to the report title.



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Secure Cloud Management Platform

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is underlined, indicating it's the active section. Below the navigation is a breadcrumb trail: Inventory / Reports / Report 6669a0d3aae316468b3c8b34. The main content area is titled "Report Inventory Summary". It features a "Stats" section with five boxes: VMs (1), Disks (1), Networks (1), Interfaces (0), and K8Ss (0). Below this is a table titled "PROVIDER: AZURE, GOOGLE | SUBSYSTEM: MAE LAB,CMPPROJECT-374610". The table has columns for Type Provider, Subsystem Name, VMs, Disks, Networks, Interfaces, and K8Ss. It lists two entries: Azure (MAE LAB) with 14 VMs, 16 Disks, 14 Networks, 0 Interfaces, and 0 K8Ss; and Google (CMPPROJECT-374610) with 1 VM, 1 Disk, 1 Network, 0 Interfaces, and 0 K8Ss. At the bottom right of the table are buttons for "PRINT" and "EXPORT".

Type Provider	Subsystem Name	VMs	Disks	Networks	Interfaces	K8Ss
Azure	MAE LAB	14	16	14	0	0
Google	CMPPROJECT-374610	1	1	1	0	0

Figura 173 – Report Details

8 Security

The SCMP's security feature shows the vulnerabilities of inventory assets present on the SCMP.

To access the “Security” feature, click the bento button in the top left. After doing so, the menu bar will appear, where you need to click on “Security”.



Figura 174 – Access to Security

8.0.1 General Dashboard

At this point, the user is on the “Dashboard” tab page where the security data of resources for all configured providers are shown in an aggregated manner.

At the top, there is a filter bar that allows filtering results by subsystem, status, and/or policy name.

After that, the user notices the presence of the bar chart indicating the compliance status of resources assigned to policies, subdivided by subsystem.

By hovering the mouse over a section of the chart, we can see that the values displayed on the page are updated to show a preview of the detail.

It is possible to click on a section of the chart to automatically apply the “subsystem” and “status” filters to the page.



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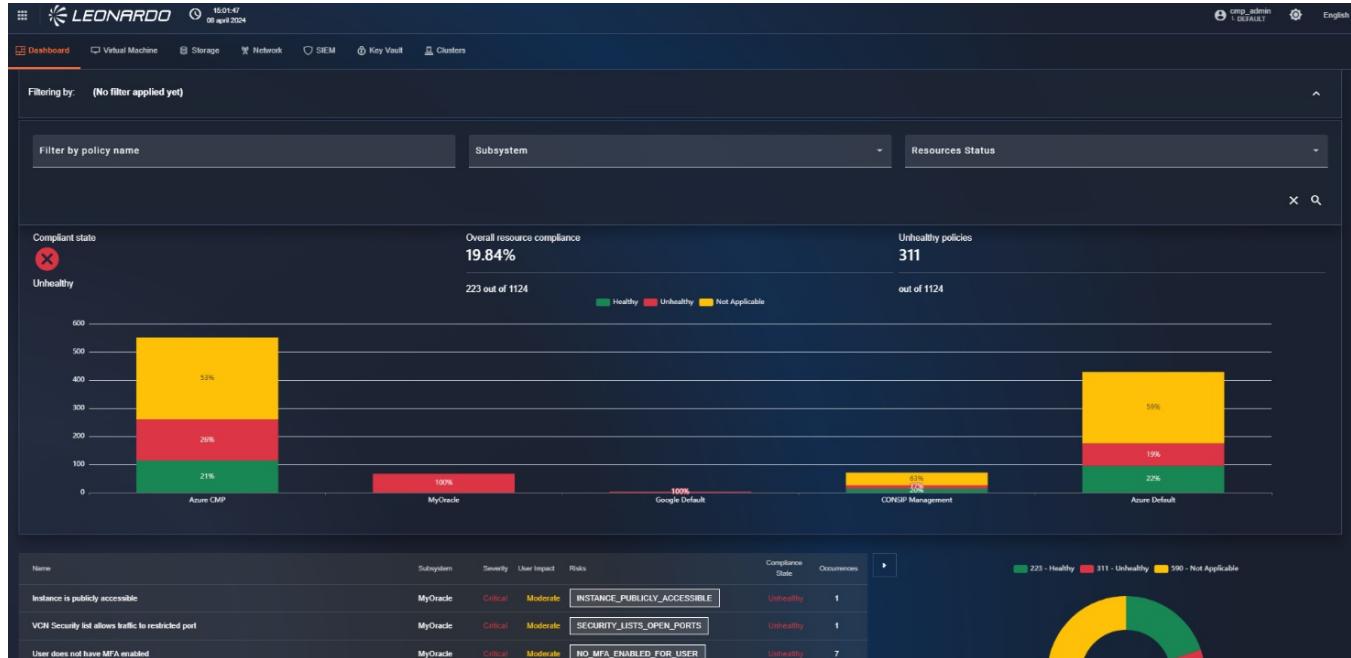


Figura 175 – Security Dashboard

Scrolling down the page, there is the policies table which will be automatically filtered based on the selected filters.

The policies table lists various security rules across different subsystems, categorized by severity (Critical, Moderate, Low) and user impact (High, Moderate, Low). Each row includes a detailed description of the rule and its associated risks.

Name	Subsystem	Severity	User Impact	Risks	Compliance State	Occurrences
Instance is publicly accessible	MyOracle	Critical	Moderate	INSTANCE_PUBLICLY_ACCESSIBLE	Unhealthy	1
VCN Security list allows traffic to restricted port	MyOracle	Critical	Moderate	SECURITY_LISTS_OPEN_PORTS	Unhealthy	1
User does not have MFA enabled	MyOracle	Critical	Moderate	NO_MFA_ENABLED_FOR_USER	Unhealthy	7
Firewall rules that allow connections from all IP addresses on TCP port 3389 or UDP port 3389 may expose RDP services to attackers		High	Moderate		Unhealthy	1
To reduce the attack surface, avoid assigning public IP addresses to your VMs. Stopped instances may still be flagged with a Public IP binding, e.g. if the network interfaces are configured to assign an ephemeral public IP on start. Ensure the network configurations for stopped instances do not include external access		High	Moderate		Unhealthy	1
Firewall rules that allow connections from all IP addresses on TCP port 22 or SCTP port 22 may expose SSH services to attackers		High	Moderate		Unhealthy	1
Firewall rules that allow connections from all IP addresses on TCP port 22 or SCTP port 22 may expose SSH services to attackers	Google Default	High	Moderate		Unhealthy	1
To reduce the attack surface, avoid assigning public IP addresses to your VMs. Stopped instances may still be flagged with a Public IP binding, e.g. if the network interfaces are configured to assign an ephemeral public IP on start. Ensure the network configurations for stopped instances do not include external access	Google Default	High	Moderate		Unhealthy	1
Firewall rules that allow connections from all IP addresses on TCP port 3389 or UDP port 3389 may expose RDP services to attackers	Google Default	High	Moderate		Unhealthy	1
All network ports should be restricted on network security groups associated to your virtual machine	Azure CMP	High	High	MaliciousInsider, DataSpillage, DataExfiltration	Unhealthy	9
Machines should be configured to periodically check for missing system updates	Azure Default	High	Low	AccountBreach, DataExfiltration, DataSpillage, MaliciousInsider	Healthy	9

Figura 176 – Policies table



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Clicking on a row in the table will open a detail window where you can find all information related to the selected policy, and the list of affected resources will also be available. It is possible to click on the name of a machine to view its details; in this case, the user will be redirected to the SCMP inventory resource in “view” mode.

The screenshot shows a detailed policy view for a specific policy named "All network ports should be restricted on network security groups associated to your virtual machine". The policy details include:

- Risks:** MaliciousInsider, DataSpillage, DataExfiltration
- Implementation Effort:** Low | **User Impact:** High | **Severity:** High
- Cloud Provider's Advice:** Defender for Cloud has identified some of your network security groups' inbound rules to be too permissive. Inbound rules should not allow access from 'Any' or 'Internet' ranges. This can potentially enable attackers to target your resources.

The main table lists affected resources:

Name	Severity	Compliance State
Resource	High	Unhealthy
/subscriptions/09837d5-2d80-4623-9b82-5a5104983d2/resourcegroups/cmp-rsg/providers/microsoft.compute/virtualmachines/vm-ubnt-manageiq	High	Unhealthy
User does not have permission to access the VM	High	Unhealthy
/subscriptions/09837d5-2d80-4623-9b82-5a5104983d2/resourcegroups/cmp-rsg/providers/microsoft.compute/virtualmachines/vm-mongo3-cmp	High	Unhealthy
To reduce risk, consider flagging this public IP address	High	Unhealthy
/subscriptions/09837d5-2d80-4623-9b82-5a5104983d2/resourcegroups/cmp-prod/providers/microsoft.compute/virtualmachines/vm-mongo4-cmp-prod	High	Unhealthy
Firewall rule: SSH service	High	Unhealthy
/subscriptions/09837d5-2d80-4623-9b82-5a5104983d2/resourcegroups/cmp-prod/providers/microsoft.compute/virtualmachines/eld-iam-ubnt-vmset_2b474302	High	Unhealthy
Firewall rule: RDP service	High	Unhealthy
/subscriptions/09837d5-2d80-4623-9b82-5a5104983d2/resourcegroups/cmp-prod/providers/microsoft.compute/virtualmachines/eld-iam-ubnt-vmset_7c0ef408	High	Unhealthy
To reduce risk, consider flagging this public IP address	High	Unhealthy
/subscriptions/09837d5-2d80-4623-9b82-5a5104983d2/resourcegroups/devbox-ig-template-vm-win11/providers/microsoft.compute/virtualmachines/vm-devbox-win11-template	High	Unhealthy
Firewall rule: RDP service	High	Unhealthy
/subscriptions/09837d5-2d80-4623-9b82-5a5104983d2/resourcegroups/devbox-ig-template-vm-win11/providers/microsoft.compute/virtualmachines/win11-machine-to-template	High	Unhealthy

Below the table, there are two additional sections:

- All network ports should be restricted on network security groups associated to your virtual machine:** Azure CMP, High, Unhealthy. Buttons: MaliciousInsider, DataSpillage, DataExfiltration.
- Machines should be configured to periodically check for missing system updates:** Azure Default, High, Low. Buttons: AccountBreach, DataExfiltration, DataSpillage, MaliciousInsider.

Figura 177 – Policy details

To exit the detail, you need to click outside the window, which will close automatically.

8.0.2 Dashboards specific to resource type

It is possible to further filter policies by resource type, using the tabs at the top of the page.

Once the resource type is selected, it is possible to navigate the pages following the methods described in the previous paragraph.



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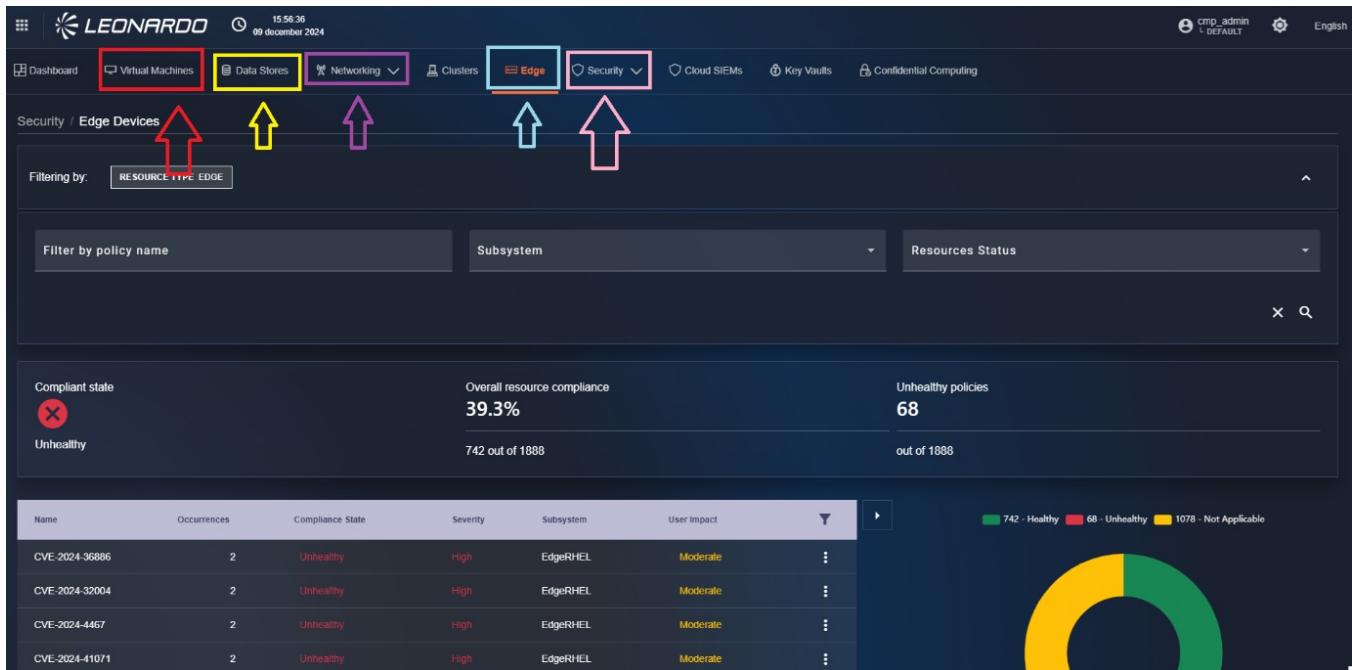


Figura 178 – Virtual Machines
compliance Dashboard

8.0.3 SIEM Dashboard

To view the SIEM dashboard, click on the tab that depicts a shield. At the top, there is a dropdown menu where you can select the subscription of interest, while next to it is a dropdown menu where you can select a time range.

Below, there is the “Summary” section which contains information, including for example “Alerts” which indicates the number of alerts. Also within the “Summary” section is the “Incidents by status” chart which indicates incidents by status.

Below the “Summary” section, there is the “Hourly Events Grouped By Type” section which contains a histogram chart indicating hourly events by type.



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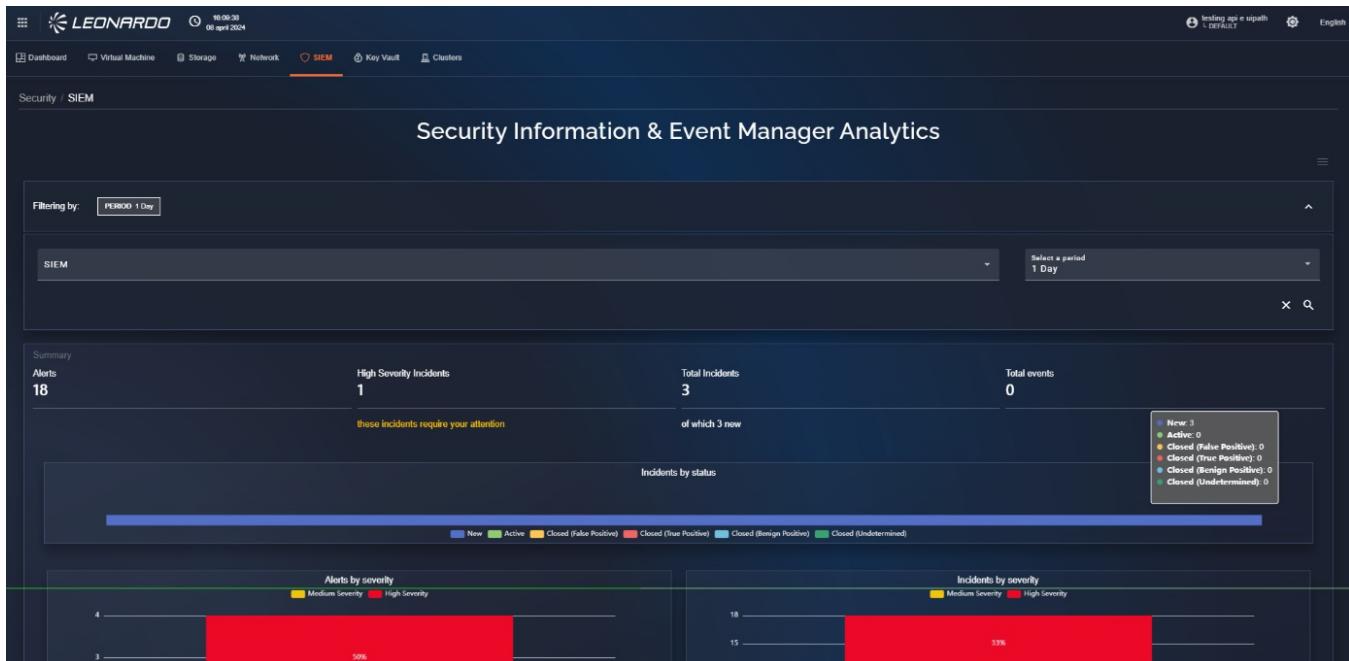


Figura 179 – SIEM Dashboard

Scrolling through the SIEM dashboard, there is the “Event types” chart which indicates all event types.

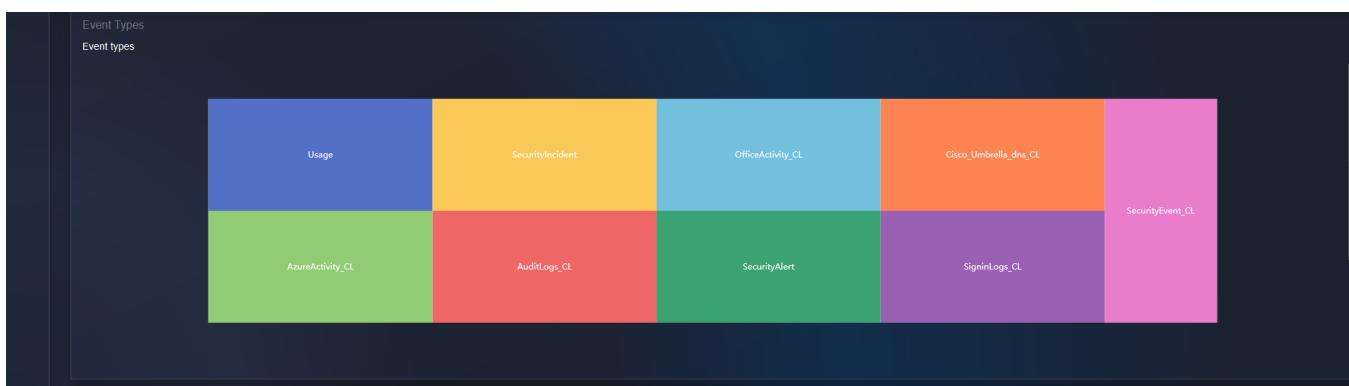


Figura 180 – “Event types” of the SIEM dashboard

Finally, at the bottom of the page, there are two tables: on the left, the “Alert rules” table which shows a set of alarm rules, while on the right, there is the “Incidents” table which shows incidents.



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Name	Severity	Kind
Solorigate Network Beacon	High	Scheduled
Sign-ins from IPs that attempt sign-ins to disabled accounts	Medium	Scheduled
Malicious Inbox Rule - custom	Medium	Scheduled
Advanced Multistage Attack Detection	High	Fusion
Azure DevOps Service Connection Abuse	Medium	Scheduled

Name	Status	Alerts count
Solorigate Network Beacon	New	6
Malicious Inbox Rule, affected user AdeleV@contoso.OnMicrosoft.com	New	6
Sign-ins from IPs that attempt sign-ins to disabled accounts	New	6

Figura 181 – “Alert rules” and
“Incidents” tables

Clicking on a row in the table will open a detail window, where you can find all information related to the selected rule or incident.

The screenshot shows the Microsoft Sentinel interface. At the top, there's a navigation bar with tabs like Dashboard, Virtual Machine, Storage, Network, SIEM (which is selected), Key Vault, and Clusters. Below the navigation is a search bar and a dropdown for filtering by period (set to 1 Day). The main area has sections for Event Types, Alert rules, and a large central modal window for the 'Advanced Multistage Attack Detection' rule. The modal window contains detailed information about the rule's description, configuration (Enable: Yes, Kind: Fusion, Name: Advanced Multistage Attack Detection, Severity: High, SIEM's UUID: 3bbc0471-3165-46fd-b937-e1c9bb8994ef), tactics (Collection, CommandAndControl, CredentialAccess, DefenseEvasion, Discovery, Execution, Exfiltration, Impact, InitialAccess, LateralMovement, Persistence, PrivilegeEscalation), and a list of detected incidents (Sign-ins from IPs that attempt sign-ins to disabled accounts, Solorigate Network Beacon, Malicious Inbox Rule - custom). At the bottom, there are two smaller tables showing other alert rules and incidents.

Figura 182 – “Incidents” details

8.0.4 Secret Manager Dashboard

To view the SIEM dashboard, click on the tab that depicts a key. At the top, there is a dropdown menu where you can select the subscription of interest.



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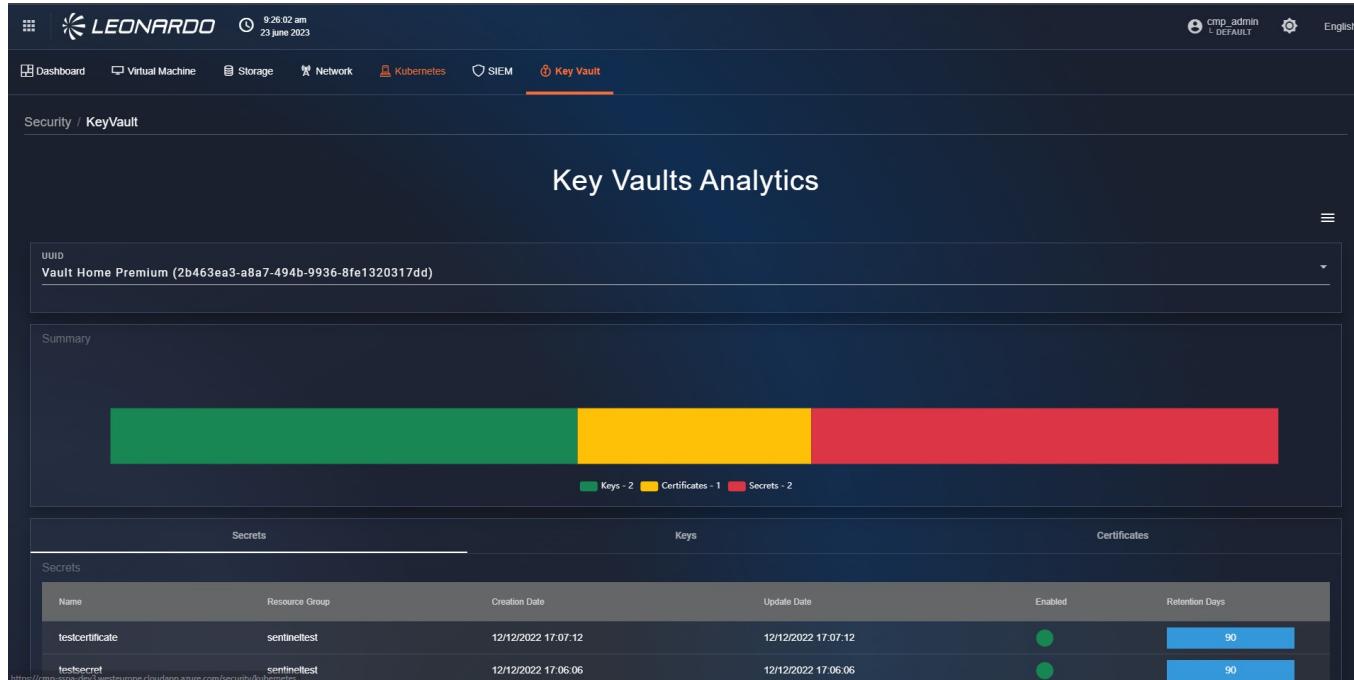


Figura 183 – Key Vault Dashboard

At the bottom of the page, you can see navigation buttons for the table and a table.

Depending on the selected page, the table will display respectively:

- Secret
- Keys
- Certificates



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Name	Resource Group	Creation Date	Update Date	Enabled	Retention Days
testcertificate	sentineltest	12/12/2022 17:07:12	12/12/2022 17:07:12	●	90
testsecret	sentineltest	12/12/2022 17:06:06	12/12/2022 17:06:06	●	90

Figura 184 – Viewable resources

Clicking on a row in the table allows you to view the detail of the selected resource.

Figura 185 – Key details

8.0.5 Clusters Dashboard

At this point, the user is on the “Dashboard” tab page where all alerts generated by the configured “Cluster” type subsystems in SCMP are shown in an aggregated manner.

At the top, there is a filter bar that allows filtering results by namespace, subscription, and/or policy name.

After that, the user notices the presence of the bar chart indicating the total number of “alerts” received, subdivided by subsystem.

By hovering the mouse over a section of the chart, we can see that the values displayed on the page are updated to show a preview of the detail.

It is possible to click on a section of the chart to automatically apply the “subsystem” filter.

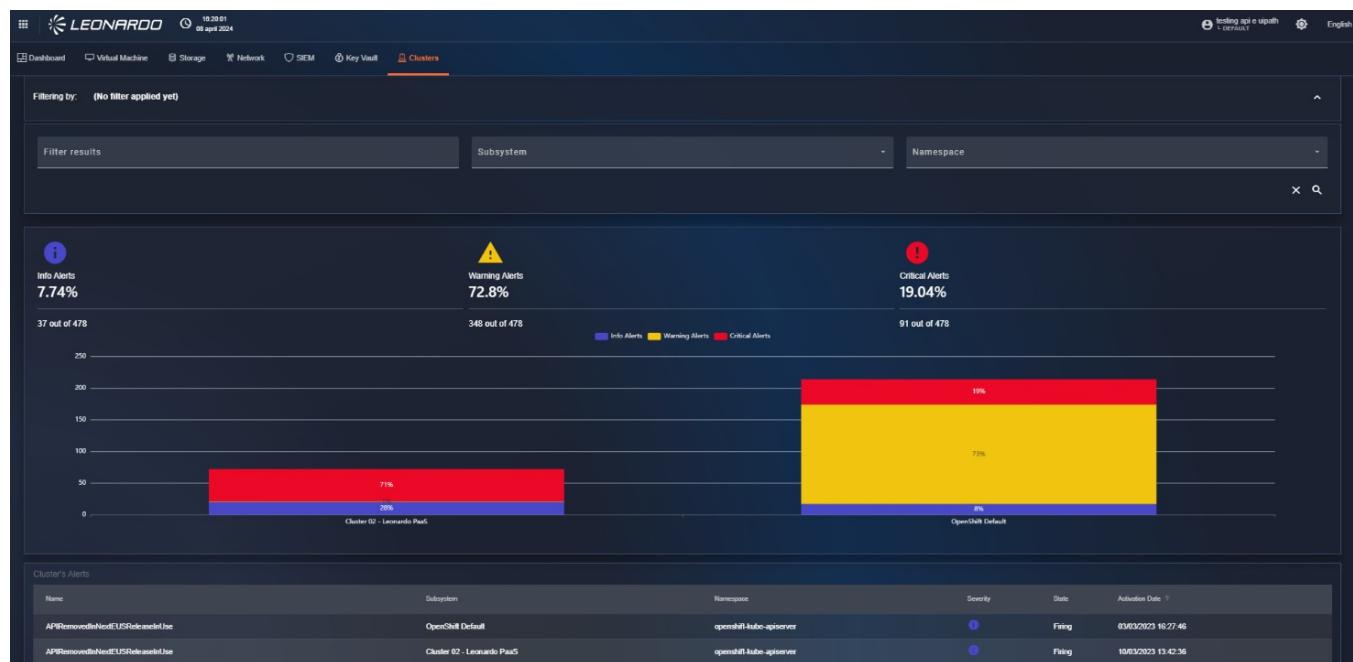


Figura 186 – “Cluster alerts” Dashboard

Scrolling down the page, there is the “alerts” table which will be automatically filtered based on the selected filters.



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Cluster's Alerts						
Name	Subsystem	Namespace	Severity	Status	Activation Date	Action
APIRemovedInNewUSAKubelessUse	OpenShift Default	openshift-kube-apisever	Info	Firing	03/03/2023 15:27:46	
APIRemovedInNewUSAKubelessUse	Cluster 02 - Leonardo PaaS	openshift-kube-apisever	Info	Firing	10/03/2023 14:42:36	
APIRemovedInNewReleaseUse	OpenShift Default	openshift-kube-apisever	Info	Firing	03/03/2023 16:27:46	
APIRemovedInNewReleaseUse	Cluster 02 - Leonardo PaaS	openshift-kube-apisever	Info	Firing	10/03/2023 13:42:36	
AggregatedLoggingSystemCPULight	Cluster 02 - Leonardo PaaS	openshift-logging	Info	Firing	22/03/2023 14:49:24	
AlermanagerClusterDown	Cluster 02 - Leonardo PaaS	openshift-monitoring	Warning	Firing	10/03/2023 16:17:37	
AlermanagerClusterDown	OpenShift Default	openshift-monitoring	Warning	Firing	03/03/2023 16:49:04	
AlermanagerClusterFailedToSendAlerts	OpenShift Default	openshift-monitoring	Warning	Firing	03/03/2023 16:49:04	
AlermanagerClusterFailedToSendAlerts	Cluster 02 - Leonardo PaaS	openshift-monitoring	Warning	Firing	10/03/2023 14:17:37	
AlermanagerConfigInconsistent	Cluster 02 - Leonardo PaaS	openshift-monitoring	Warning	Firing	10/03/2023 14:17:37	
AlermanagerConfigInconsistent	OpenShift Default	openshift-monitoring	Warning	Firing	03/03/2023 16:49:04	
AlermanagerFailedReload	Cluster 02 - Leonardo PaaS	openshift-monitoring	Critical	Firing	10/03/2023 16:17:37	
AlermanagerFailedReload	OpenShift Default	openshift-monitoring	Critical	Firing	03/03/2023 16:49:04	

Figura 187 – Alerts table

Clicking on a row in the table will open a detail window, where you can find all information related to the selected “alert”.

The screenshot shows a detailed view of an alert for a virtual machine. The top navigation bar includes 'Dashboard', 'Virtual Machine', 'Storage', 'Network', 'SIEM', 'Key Vault', and 'Clusters'. A sidebar on the left shows filtering options and a 'Policy Details' section stating: 'All network ports should be restricted on network security groups associated to your virtual machine'. The main content area displays a table of findings:

Name	Severity	Compliance State
VCN Security	High	Unhealthy
User IP	High	Unhealthy
Firewall rule RDP service To reduce risk be flagged as public IP on	High	Unhealthy
Firewall rule SSH service To reduce risk be flagged as public IP on	High	Unhealthy
Firewall rule RDP service To reduce risk be flagged as public IP on	High	Unhealthy
Firewall rule RDP service To reduce risk be flagged as public IP on	High	Unhealthy
All network ports should be restricted on network security groups associated to your virtual machine	Azure CMP: High	MaliciousInsider: DataSpillage: DataExfiltration: Critical: 9
Machines should be configured to periodically check for missing system updates	Azure Default: High	AccountBreach: DataExfiltration: DataSpillage: MaliciousInsider: Healthy: 9

Figura 188 – Alert details on clusters

To exit the detail, you need to click outside the window, which will close automatically.

8.0.6 Compliance Dashboard

To view the compliance dashboard, click on the tab that depicts a document in the security module.



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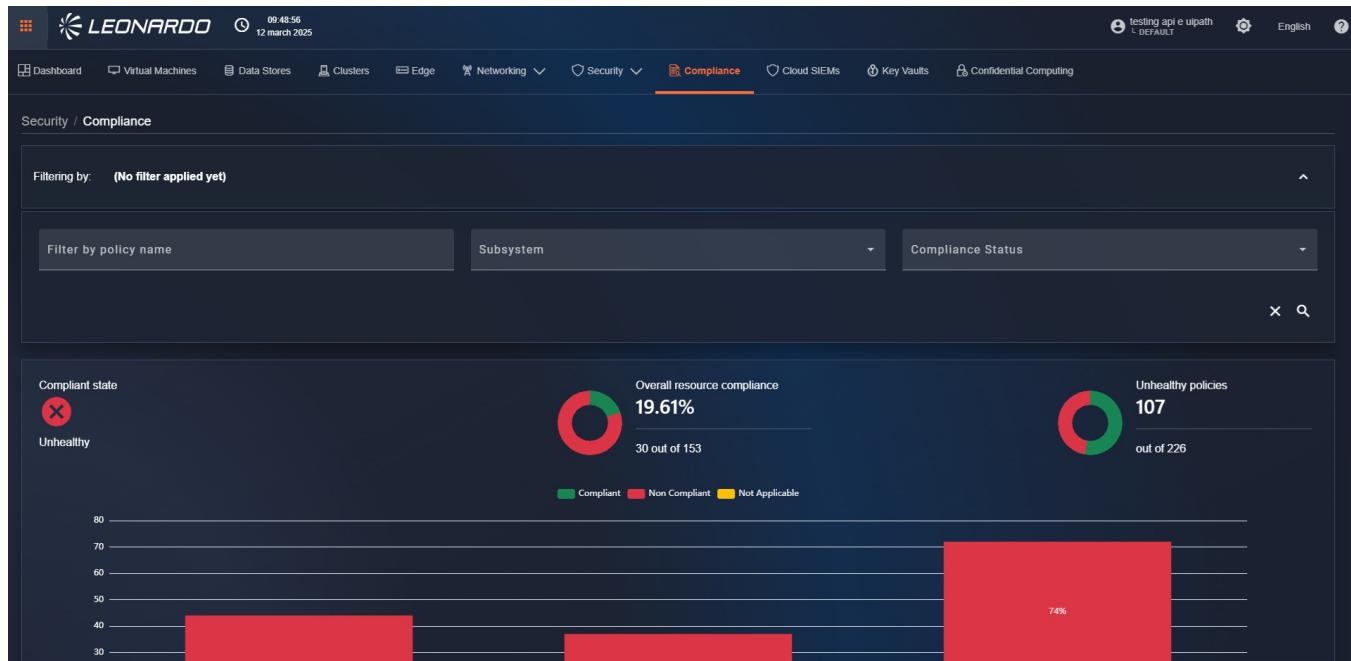


Figura 189 – Compliance dashboard

At this point, the user is on the "Compliance" tab page, composed of 4 sections. The first section contains filters that allow searching by policy name, subsystem, and/or compliance status. The second section, always active, contains pie charts that indicate the general status of the filtered resources.

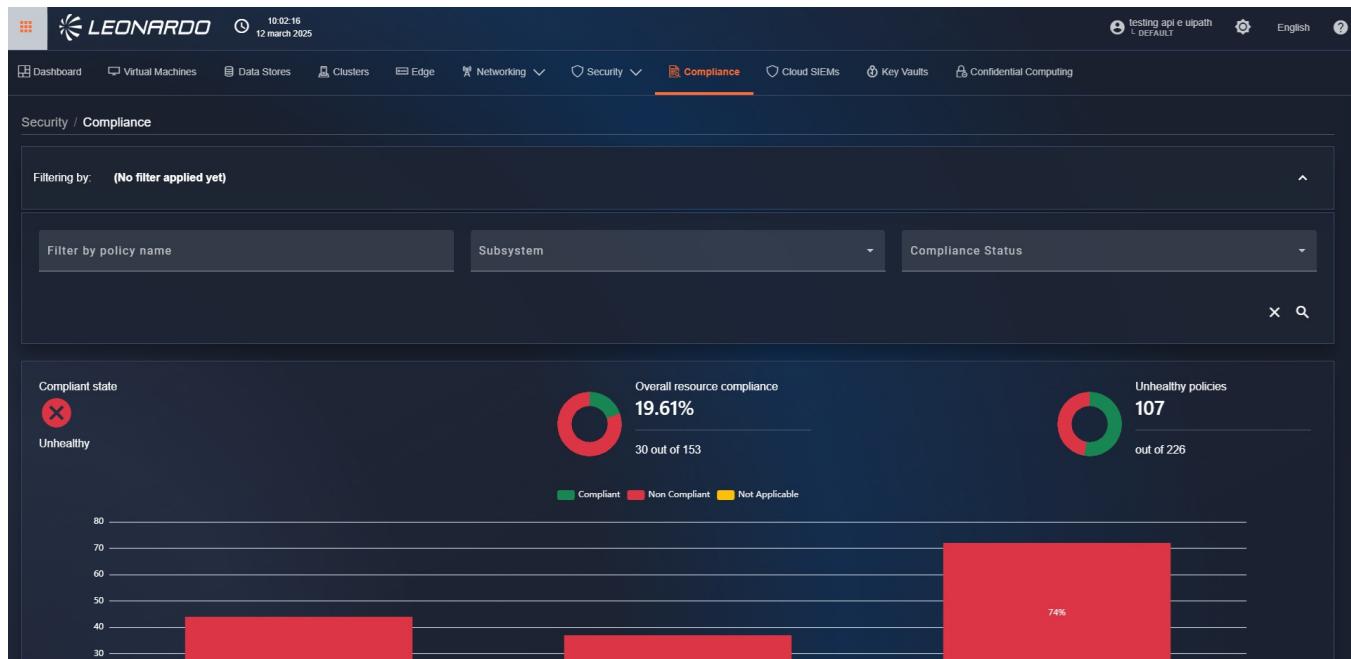


Figura 190 – “Filters” and “pie charts” sections

The third section, active only if multiple different subsystems are present in the results, shows a bar chart, subdivided by provider, of the compliance status of resources. The last section contains a table with general information on policy groups.

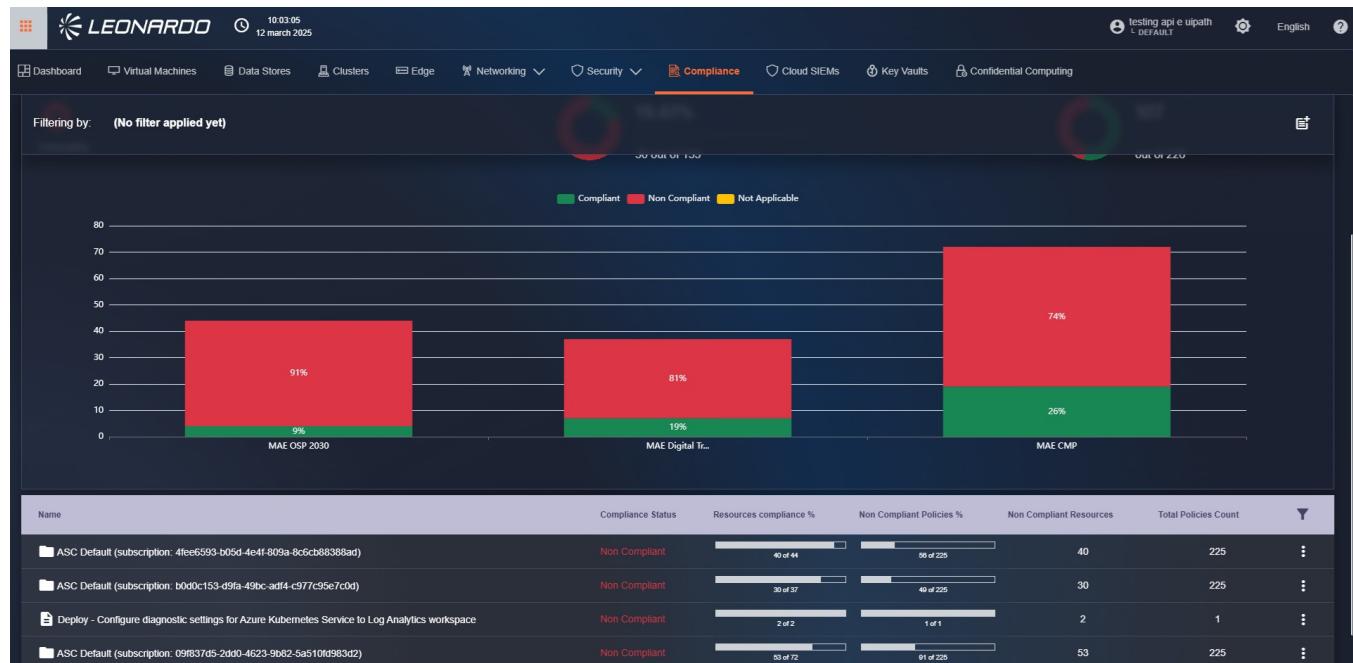


Figura 191 – “Bar charts” and “table” sections

Clicking on a row in the table opens a modal where it will be possible to view the list of all policies configured in the group, with the relative resource count. Still within the modal, we can click on one of the displayed policies; doing so will show at the bottom the list of all machines assigned to the policy and their respective status. Next to each resource, a “link” button is available; once clicked, the user will be redirected to the inventory page of the selected resource.



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The screenshot shows a dashboard titled "Policy Set's Details: ASC Default (subscription: b0d0c153-d9fa-49bc-adf4-c977c95e7c0d)". The main table displays the following data:

Name	Total Resources Count	Policy Assignment Name	Subsystem	Compliance Status
A Microsoft Entra administrator should be provisioned for MySQL servers	0	ASC Default (subscription: b0d0c153-d9fa-49bc-adf4-c977c95e7c0d)	MAE Digital Transformation	Compliant
A Microsoft Entra administrator should be provisioned for PostgreSQL servers	0	ASC Default (subscription: b0d0c153-d9fa-49bc-adf4-c977c95e7c0d)	MAE Digital Transformation	Compliant
A maximum of 3 owners should be designated for your subscription	1	ASC Default (subscription: b0d0c153-d9fa-49bc-adf4-c977c95e7c0d)	MAE Digital Transformation	Non Compliant
A vulnerability assessment solution should be enabled on your virtual machines	6	ASC Default (subscription: b0d0c153-d9fa-49bc-adf4-c977c95e7c0d)	MAE Digital Transformation	Non Compliant
API Management APIs should use only encrypted protocols	0	ASC Default (subscription: b0d0c153-d9fa-49bc-adf4-c977c95e7c0d)	MAE Digital Transformation	Compliant

Below the table, a message states: "Resources related to the policy: A vulnerability assessment solution should be enabled on your virtual machines". A secondary table lists resources:

Resource Name	Compliance Status	Resource Link
/subscriptions/b0d0c153-d9fa-49bc-adf4-c977c95e7c0d/resourcegroups/vm-pqp-class_group/providers/microsoft.compute/virtualmachines/vm-pqp-class	Non Compliant	🔗
/subscriptions/b0d0c153-d9fa-49bc-adf4-c977c95e7c0d/resourcegroups/resourcegrp-mida/providers/microsoft.compute/virtualmachines/trading-vm-testvpn	Non Compliant	🔗
/subscriptions/b0d0c153-d9fa-49bc-adf4-c977c95e7c0d/resourcegroups/resourcegrp-mida/providers/microsoft.compute/virtualmachines/oms-sonar	Non Compliant	🔗
/subscriptions/b0d0c153-d9fa-49bc-adf4-c977c95e7c0d/resourcegroups/mida-db2-rg/providers/microsoft.compute/virtualmachines/mida-db2	Non Compliant	🔗
/subscriptions/b0d0c153-d9fa-49bc-adf4-c977c95e7c0d/resourcegroups/resourcegrp-mida/providers/microsoft.compute/virtualmachines/mida-database-vm	Non Compliant	🔗

Figura 192 – Policy details

9 Catalog

The Catalog section has three important features:

- Displaying the list of installable assets retrieved from providers, along with their associated prices and regions.
- Enabling the tenant administrator to define items that can be subsequently used for provisioning.
- Enabling the tenant administrator to define items that can be subsequently used within What If module simulations.

The retrieved prices, in addition to being visible within the asset's details, are used for What If scenarios and cost calculation.

To access the Catalog functionality, click on the bento button in the upper left corner.

Then, click on "Catalog".



Figura 193 – Accesso a Catalog

At this point, the user is on the "Resources" tab page.

We can divide the functionality into 3 sections to specify its behavior:

- SCMP catalog items (yellow box in the image).

- Provider catalog items (green box in the image).
- SCMP catalog services and blueprints (red box in the image).

Below, we will analyze each group of functionalities separately.

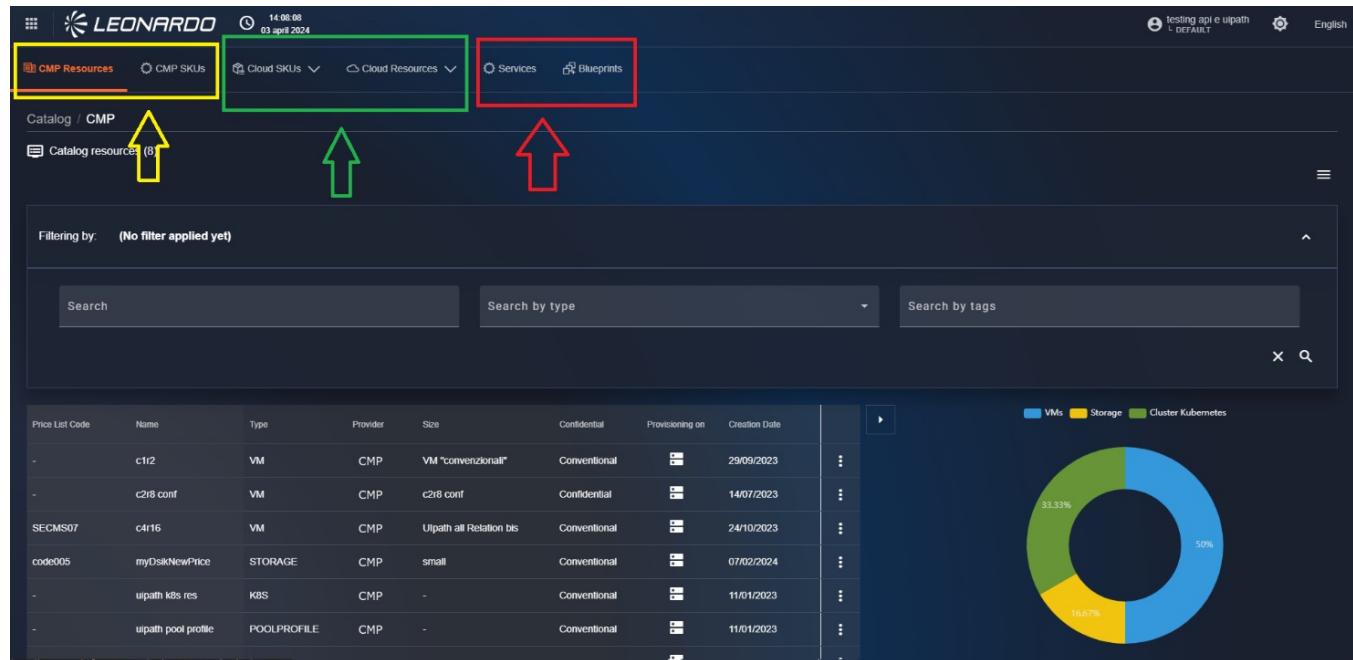


Figura 194 – Catalogo della SCMP

9.0.1 SCMP Catalog Item Management

On the page, there is a series of filters that, once selected and by clicking on the magnifying glass button, will be used to filter the list of results.



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The screenshot shows the Leonardo SCMP interface. At the top, there are navigation links for CMP Resources, CMP SKUs, Cloud SKUs, Cloud Resources, Services, and Blueprints. The main area is titled 'Catalog / CMP' and shows 'Catalog resources (3)'. A search bar at the top allows filtering by type ('TYPE VM') and tags. Below the search bar is a table listing three VM resources:

Price List Code	Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date
-	c1r2	VM	CMP	VM "convenzionali"	Conidential	29/09/2023	
-	c2r6 conf	VM	CMP	c2r6 conf	Conidential	14/07/2023	
SECMS07	c4r16	VM	CMP	Ulpath all Relation bts	Conidential	24/10/2023	

At the bottom right of the table, there is a large blue donut chart with the text 'VMs' and '100%'.

Figura 195 – Catalogo SCMP filtrato

■ Association between SCMP catalog resource/SKU and Provider catalog resource/SKU

To allow the system to correctly calculate costs, it is necessary that the SCMP catalog resource or SKU contains a reference to the actual ID retrieved from the provider (as explained in this section) in order to correctly overwrite the cost of the resource / SKU.

Next to the magnifying glass button, there is an "X" button to reset the filters and the resource table.

Below the search filter, there is a search filter for tags.

Click on it and select a tag; at this point, the table returns the resources associated with the tag selected by the user.

9.0.1.1 Resources and relationships between resources

Within the SCMP, it is possible to configure a "Relationship" type resource. This relationship allows mapping machines from various providers to modify their costs and enable their use in other functionalities (e.g., for cost calculation).

Automatic Relationships

If a price list resource with the provider's UUID but no relationship is present in the SCMP catalog, the relationship will be created automatically, and costs will be updated accordingly. After a few minutes, the relationship will also be visible within the catalog.

To access the relationships page, click the "SCMP Resources" tab at the top of the Catalog functionality.

The screenshot shows the Leonardo Secure Cloud Management Platform (SCMP) interface. At the top, there is a navigation bar with the Leonardo logo, the date (23 aprile 2024), and a user icon. Below the navigation bar, there is a breadcrumb trail: Catalog / CMP. A red box highlights the 'CMP Resources' tab, which is currently active. An arrow points from the text 'click the "SCMP Resources" tab' to this highlighted tab. The main content area displays a table of catalog resources with columns: Price List Code, Name, Type, Provider, Size, Confidential, Provisioning on, and Creation Date. The table contains several entries, such as 'myDiskNewPrice' (STORAGE, CMP, small, Conventional), 'rel002' (VM, CMP, cat0, Conventional), and 'uipath k8s res' (K8S, CMP, -, Conventional). To the right of the table is a pie chart showing the distribution of resources by type: VMs (blue), Storage (yellow), and Cluster Kubernetes (green). The pie chart indicates 40% for VMs, 20% for Storage, and 40% for Cluster Kubernetes. A callout box points to the pie chart with the text 'Risorse' and 'VMs - 2'. Below the table, there is a filter section with 'Search', 'Search by type', and 'Search by tags' fields, along with a 'Filtering by' dropdown set to '(No filter applied yet)'.

Figura 196 – Accesso a "SCMP resources"

At the top, there is a filter section that allows searching by:

- "Search": allows entering free text for searching.
- "Search By tags": allows searching using tags associated with resources.
- "Search by Service name": allows searching by service name.

9.0.1.1.1 RESOURCE EXPORT

To export the list of Catalog resources present in the list, on the page, in the upper right corner, click on the hamburger menu, and then click on "Export".

The operator will have the option to export the list of results in .csv and/or .json format.



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Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date
Audio Analytics	AIMODEL	CMP	-	Conventional	03/03/2023	
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint Retail	BLUEPRINT	CMP	-	Conventional	21/06/2023	
MyApplication	BLUEPRINT	CMP	-	Conventional	24/01/2023	
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	
PaaS - IAM	PAAS	CMP	-	Conventional	14/06/2023	
PaaS - Kafka	PAAS	CMP	-	Conventional	09/06/2023	

Figura 197 – Scaricare la lista di risultati

9.0.1.1.2 FORCED CATALOG UPDATE FUNCTIONALITY

Through the Force Sync functionality, it is possible to request a catalog update by clicking on the hamburger menu and then clicking on "Force Sync".

Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date
Audio Analytics	AIMODEL	CMP	-	Conventional	03/03/2023	
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint Retail	BLUEPRINT	CMP	-	Conventional	21/06/2023	
MyApplication	BLUEPRINT	CMP	-	Conventional	24/01/2023	
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	
PaaS - IAM	PAAS	CMP	-	Conventional	14/06/2023	

Figura 198 – Funzionalità Force Sync

9.0.1.1.3 CATALOG RELATIONSHIP CREATION



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To create a resource in the Catalog, always on the page, in the upper right corner, click on the hamburger menu, and then click on "Add Catalog Resource".

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with various cloud provider icons like AWS, Azure, Google, and OpenShift, along with service categories such as Blueprints, Services, Custom Services, AI Services, and PaaS. On the far right of the top bar, there are user profile and language settings. Below the bar, the main title is 'Catalog / CMP'. Underneath, it says 'Catalog resources (21)'. There are two search bars: 'Search' and 'Search by tags'. To the right of the search bars is a red-bordered box containing three options: '+ Add Catalog Resource', 'Export', and 'Force Sync'. Below these options is a donut chart showing resource distribution: 60% VMs and 40% Cluster Kubernetes. The main area displays a table of catalog resources with columns for Name, Type, Provider, Size, Confidential, Provisioning on, and Creation Date. Each row has a 'More' button (three dots) at the end.

Figura 199 – Opzione per aggiungere una risorsa

At this point, the user is on the page where they can select the type of resource to create.

The screenshot shows the 'Create' page within the Leonardo Secure Cloud Management Platform. The top navigation bar includes the Leonardo logo, a timestamp (10:14:37 am, 20 June 2023), user profile (cmp_admin, DEFAULT), and language (English). Below the bar, the path 'Catalog / CMP / Create' is shown. The main content area features a dropdown menu with 'Taxonomies' and 'Type' selected. Under 'Type', 'VM' is highlighted. At the bottom of the page is a large 'Next' button.

Figura 200 – Selezione del tipo di risorsa da creare

From the dropdown menu, select the type of resource to create. Then, click the "Next" button. You will be on the resource compilation page.



Figura 201 – Esempio di form per la creazione di una relazione

The individual parameters to be entered in the "Properties" section are specified in the table:

Mandatory parameters are indicated with *

Name	Type	Description	Example
category	string	Enter the resource's category	CAT0004BT
Price list code	string	Enter the price list identifier code from which associations are derived	PRC005DE
confidential	boolean	If enabled, indicates that the resource is confidential	false
description	string	Enter a free description of the resource	Low end machine
Name*	string	Enter the resource name	8Core16GB- small
RAM(GIB)*	integer	Enter here the quantity in GiB used by the machines included in the relationship	16
VCPU*	integer	Enter here the number of vCPUs used by the machines included in the relationship	8

On the resource creation page, fill in all fields in the "Properties" section. After doing this, select one or more tags for the "Add SCMP tag..." field and fill in notes in the "Tags & Note" section.



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The screenshot shows a dark-themed web interface for creating a new resource. At the top, there's a navigation bar with links for 'CMP Resources', 'Cloud SKUs', 'Cloud Resources', 'Services', and 'Blueprints'. Below the navigation, the path 'Catalog / CMP / Create' is visible. The main area is titled 'New resource Virtual Machine del Catalogo'. A large modal window is open, divided into several tabs: 'Properties' (which is active and shown in light blue), 'Tags & Notes', 'Relations', and 'Costs'. The 'Tags & Notes' tab contains fields for adding a CMP tag and entering notes. The 'Relations' tab is currently empty. At the bottom right of the modal are 'Save' and 'Close' buttons.

Figura 202 – Sezione tag e note

In the "Relations" section, open the left section. Subsequently, it is possible to use the "search" filters with free text or select a "System Type" from those available to filter the resource table.

Once the resource to be associated is identified, drag and drop it from the right side of the page to the left side.

It is possible to add only one resource per provider type. If the user tries to insert another resource from the same provider, a pop-up will appear inviting the user to add only one resource per provider.



The screenshot shows the 'Relations' section of the 'New resource Virtual Machine del Catalogo' creation form. On the left, a list of providers is shown under 'Provided by' with a 'COMPOSITION' indicator. On the right, a search interface allows selecting a provider from a list of resources.

Type	Name	CPU	RAM
VMCatalogoOracle	BM... AzureStackHCI	128	2048 Gi
VMCatalogoOracle	BM... AzureStackHybridCloud	2	768 GiB

Figura 203 – Selezione del provider per associare le risorse

We can make a "single" association by entering only one machine in this section. In this way, the system allows us to manually select a customized price to associate with the resource in the "Cost" section below. To do this, select the billing interval (hourly, daily, weekly, monthly) and enter the cost relative to the selected period on the right.

The screenshot shows the 'Cost' section of the 'New resource Virtual Machine del Catalogo' creation form. It includes a dropdown menu for selecting a billing interval (Hourly, Daily, Weekly, Monthly) and a text input field for entering a cost value (€100).



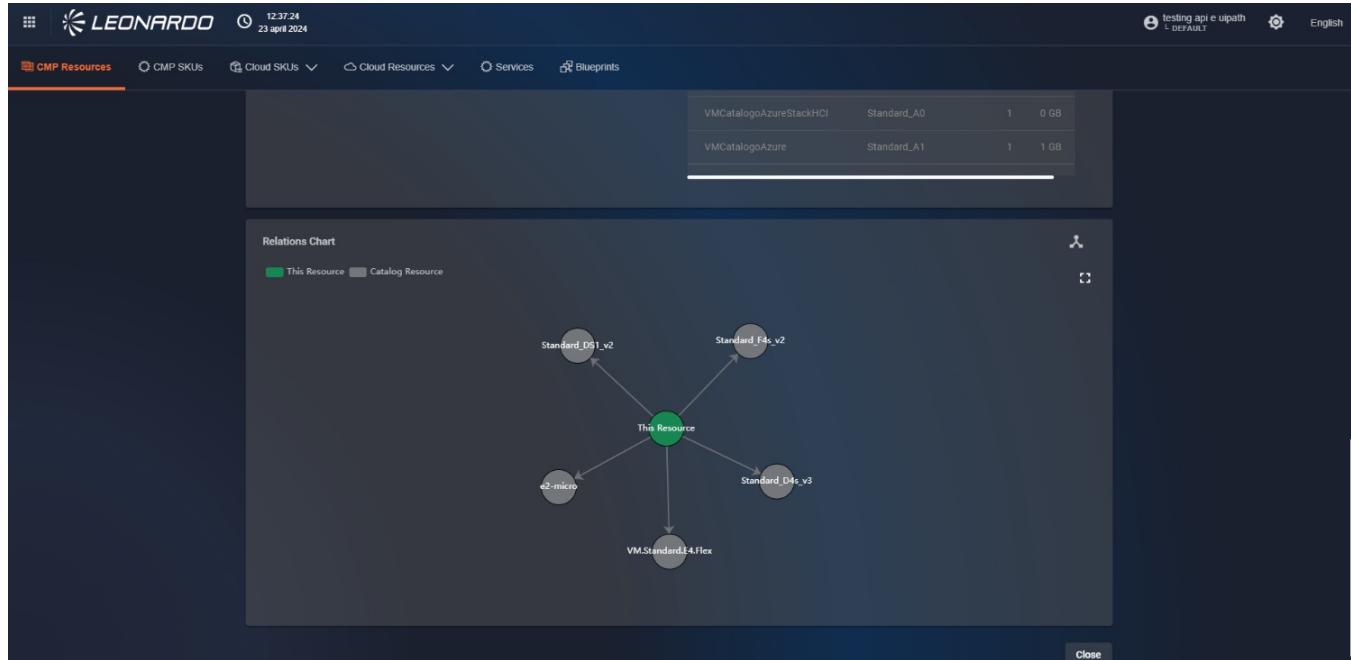
Figura 204 – Sezione costi delle relazioni

By selecting more than one machine per provider, the cost section is automatically hidden; the applied costs will be defined by the percentages configured in the subsystems.

Type	Name	CPU	RAM
VMCatalogoOracle	BM.DenseIO.E4.128	128	2048 GiB
VMCatalogoOracle	BM.DenseIO2.52	52	768 GiB
VMCatalogoOracle	BM.Optimized3.36	36	512 GiB
VMCatalogoOracle	BM.Standard.A1.160	160	1024 GiB
VMCatalogoOracle	BM.Standard.E3.128	128	2048 GiB
VMCatalogoOracle	BM.Standard.E4.128	128	2048 GiB
VMCatalogoOracle	BM.Standard2.52	52	768 GiB
VMCatalogoOracle	BM.Standard3.64	64	1024 GiB
VMCatalogoAzure	Basic_A0	1	0 GiB
VMCatalogoAzureStack	Basic_A0	1	0 GiB

Figura 205 – Risorse associate alla risorsa SCMP

Once the resources are related, an illustrative diagram will automatically be created in the 'Relations Chart' section.



*Figura 206 – Creazione automatica del
Relation Chart*

Finally, in the bottom right, click the "Save" button to save the changes. A banner will appear at the bottom, notifying the user of the successful resource creation, and the user will be redirected to the page containing the list of resources.

9.0.1.1.4 USING THE CATALOG TABLE

9.0.1.1.4.1 Resource Summary View

To view the data of an SCMP resource, on the "Resources" page of Catalog, in the list of resources, click on the record of interest for a resource. A window will appear showing brief information about the identified resource: System, Name, Size, Update Date, RAM, and CPU as shown in the following image.



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Name	Type	Provider	Size	Confidential	Positioning on	Creation Date
Audio Analytics	AIMODEL	CMP	-	Conventional	03/03/2023	
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	21/06/2023	
Blueprint Retail	BLUEPRINT	CMP	-	Conventional	24/01/2023	
MyApplication	BLUEPRINT	CMP	-	Conventional	14/06/2023	
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	

Details for VM-AllProvider:

System	CMP	Name	VM-AllProvider
Name	VM-AllProvider	RAM(GiB)	8
Size	i3-micro.d2s_v3.e2-micro	vCPUs	2
Update Date	23/06/2023		

A pie chart on the right shows resource distribution: 66.67% VMs and 33.33% Cluster Kubernetes.

Figura 207 – Dettaglio rapido delle risorse di catalogo

9.0.1.1.4.2 Viewing Catalog Relationships

To view the data of an SCMP resource, on the "Resources" page of Catalog, in the list of resources, click on the kebab menu for a resource and then click on "Show".

Name	Type	Provider	Size	Confidential	Positioning on	Creation Date
Audio Analytics	AIMODEL	CMP	-	Conventional	03/03/2023	
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint Retail	BLUEPRINT	CMP	-	Conventional	21/06/2023	
MyApplication	BLUEPRINT	CMP	-	Conventional	24/01/2023	
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	
PaaS - IAM	PAAS	CMP	-	Conventional	14/06/2023	
PaaS - Kafka	PAAS	CMP	-	Conventional	09/06/2023	
PaaS - Nginx	PAAS	CMP	-	Conventional	10/05/2023	
PaaS - Spark	PAAS	CMP	-	Conventional	14/06/2023	

A pie chart on the right shows resource distribution: 60% VMs and 40% Cluster Kubernetes.

Figura 208 – Accesso alla risorsa in modalità view

After doing this, the user is on the resource page in view mode, where they can see the data but cannot modify it.



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The screenshot shows a detailed view of a virtual machine resource in the catalog. The top navigation bar includes links for CMP, AWS, Azure, Azure Stack, Azure Stack HCI, AzureStack Hybrid Cloud, Google, OpenShift, VMWare, Blueprints, Services, Custom Services, AI Services, and PaaS. The main content area displays the following information:

Virtual Machine del Catalogo (v1.1)		Details	
System	CMP	Name	vm-small-all-Azure
Name	vm-small-all-Azure	RAM(GiB)	8
Size	Standard_D4msDs1_v2_F8s_v2	N° VCPUs	2
Update Date	06/06/2023		

Below the table, there is a sidebar with the following sections: Properties, Tags & Notes, Relations, Costs, and Relations Chart. A 'Close' button is located at the bottom right of the modal window.

Figura 209 – Dettaglio completo delle risorse di catalogo

The detail of a resource is divided into various sections:

- Details.
- Properties.
- Tags & Notes.
- Relations.
- Cost, if present.
- Relations Chart.



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The screenshot shows a detailed view of a catalog item named 'vm-small-all-Azure'. The 'Properties' tab is active, displaying configuration details such as Name, RAM, and vCPUs. A red box highlights this tab.

Virtual Machine del Catalogo (v1.1)		Details	
System	CMP	Name	vm-small-all-Azure
Name	vm-small-all-Azure	RAM(GB)	8
Size	Standard_B4ms_Ds1_v2_F8s_v2	N° vGPUs	2
Update Date	06/06/2023		

Properties

- Category: Standard_B4ms_Ds1_v2_F8s_v2
- Confidential
- Description
- Name: vm-small-all-Azure
- RAM(GB): 8
- vCPUs: 2

Tags & Notes

Relations

Costs

Relations Chart

Figura 210 – Sezione proprietà degli elementi del catalogo

The screenshot shows the 'Tags & Notes' section for the same catalog item. A red box highlights the 'Tags & Notes' tab.

Virtual Machine del Catalogo (v1.1)		Details	
System	CMP	Name	vm-small-all-Azure
Name	vm-small-all-Azure	RAM(GB)	8
Size	Standard_B4ms_Ds1_v2_F8s_v2	N° vGPUs	2
Update Date	06/06/2023		

Tags & Notes

- Provider tags...
- Add CMP tag...
- Notes

Relations

Costs

Relations Chart

Figura 211 – Sezione Tags & Note degli elementi del catalogo

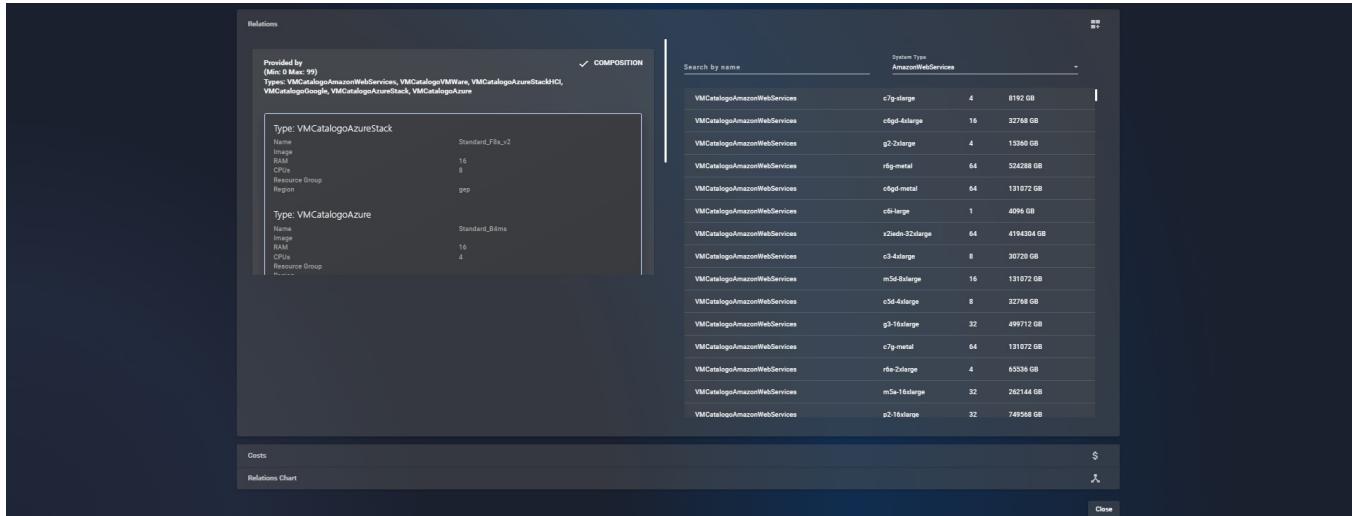


Figura 212 – Sezione delle relazioni del catalogo SCMP

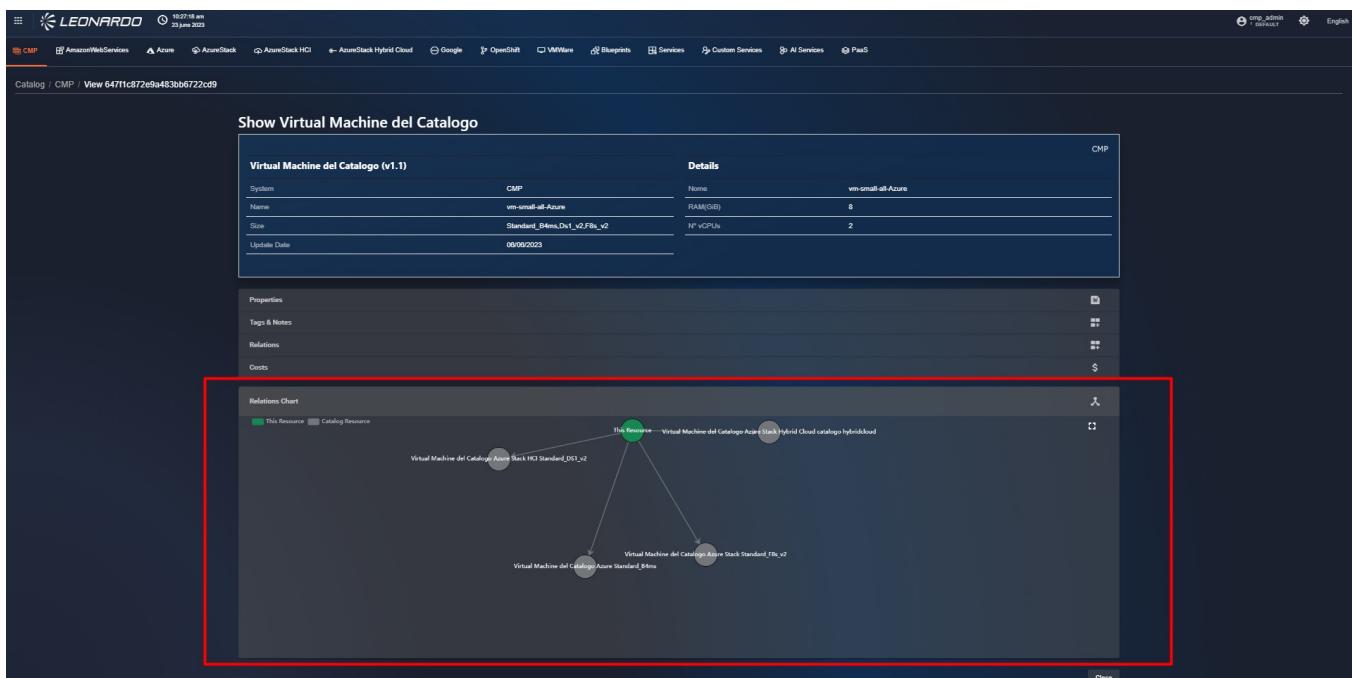


Figura 213 – Sezione Relations Chart delle risorse

In the bottom right, click the "Close" button. The user will be redirected to the "Resources" page of Catalog.

9.0.1.1.4.3 Editing Catalog Relationships



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Secure Cloud Management Platform

To modify an SCMP resource, on the "Resources" page of Catalog, in the list of resources, click on the kebab menu for a resource and then click on "Edit".

The screenshot shows the Leonardo SCMP interface. At the top, there's a navigation bar with various service icons like CMP, AWS, Azure, etc. Below it, a secondary navigation bar has 'Catalog' and 'CMP' tabs, with 'Catalog' being active. The main area is titled 'Catalog resources (20)' and contains a table of resources. The first row, 'MyApplication', has its 'Edit' option highlighted with a red box and a red arrow pointing to it from the left. To the right of the table is a dashboard with two donut charts: one for VMs (blue) and Cluster Kubernetes (green), and another for Conventional resources (red). The bottom of the screen shows pagination controls.

Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date	Actions
Audio Analytics	AIMODEL	CMP	-	Conventional	VM	03/03/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	VM	09/01/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	VM	09/01/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
MyApplication	BLUEPRINT	CMP	-	Conventional	VM	24/01/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
PaaS - AI Platform	PAAS	CMP	-	Conventional	VM	14/06/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
PaaS - IAM	PAAS	CMP	-	Conventional	VM	14/06/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
PaaS - Kafka	PAAS	CMP	-	Conventional	VM	09/06/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
PaaS - Nginx	PAAS	CMP	-	Conventional	VM	16/05/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
PaaS - Spark	PAAS	CMP	-	Conventional	VM	14/06/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮
Pro Blueprint Edition	BLUEPRINT	CMP	-	Conventional	VM	30/01/2023	⋮ Show ⋮ Edit ⋮ Delete ⋮ Instance ⋮

Figura 214 – Accesso alla risorsa in modalità edit

After doing this, the user is on the resource page in edit mode. Unlike 'Show' mode, in 'Edit' mode, it is possible to modify the Properties section and the Cost section.

In the bottom right, click the "Save" button. At this point, a banner will appear at the bottom, notifying the user of the successful resource update.

In addition, the user will be redirected to the "Resources" page of Catalog.



The screenshot shows a dark-themed interface for managing catalog resources. A modal window titled 'Properties' is open, displaying the following details for a resource named 'uipathRelat001':

- Name:** uipathRelat001
- Price List Code:** priceCode001
- Confidential:**
- Description:** descrizione relazione estesa
- Name ***: uipathRelation1
- RAM(GiB) ***: 8
- vCPUs ***: 4

Figura 215 – Modifica della relazione

9.0.1.1.4.4 Deleting Catalog Relationships

To delete an SCMP resource, on the "Resources" page of Catalog, in the list of resources, click on the kebab menu for a resource and then click on "Delete".

The screenshot shows the 'Catalog / CMP' page with a list of catalog resources. One resource, 'MyApplication', has a context menu open, with the 'Delete' option highlighted. To the right of the table, there are two donut charts: one showing VMs and Cluster Kubernetes distribution, and another showing Conventional usage.

Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date	Actions
Audio Analytics	AMODEL	CMP	-	Conventional	03/02/2023	03/02/2023	⋮
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	09/01/2023	⋮
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	09/01/2023	09/01/2023	⋮
MyApplication	BLUEPRINT	CMP	-	Conventional	24/01/2023	24/01/2023	⋮
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	14/06/2023	⋮
PaaS - IAM	PAAS	CMP	-	Conventional	14/06/2023	14/06/2023	⋮
PaaS - Kafka	PAAS	CMP	-	Conventional	09/06/2023	09/06/2023	⋮
PaaS - Nginx	PAAS	CMP	-	Conventional	16/06/2023	16/06/2023	⋮
PaaS - Spark	PAAS	CMP	-	Conventional	14/06/2023	14/06/2023	⋮
Pro Blueprint Edition	BLUEPRINT	CMP	-	Conventional	30/01/2023	30/01/2023	⋮



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Figura 216 – Eliminazione di una risorsa

Once done, a modal appears where it is necessary to click the "Remove" button to confirm the resource deletion.

Name	Type	AIModel	Status	Last Update	Actions	
Audio Analytics	BLUEPRINT	CMP	-	Conventional	09/01/2023	⋮
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	⋮
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	24/01/2023	⋮
MyApplication	BLUEPRINT	CMP	-	Conventional	14/06/2023	⋮
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	⋮
PaaS - IAM	PAAS	CMP	-	Conventional	14/06/2023	⋮
PaaS - Kafka	PAAS	CMP	-	Conventional	09/06/2023	⋮

Figura 217 – Conferma eliminazione della risorsa

9.0.1.2 Resources and relationships between SKUs

Within the SCMP, it is possible to configure an "SCMP SKU" type resource. This relationship allows mapping SKUs received from providers to define their costs and the unit of measure displayed in the system.

To access the SKUs page, click the "SCMP SKU" tab at the top of the Catalog functionality.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with tabs for 'CMP Resources' (selected), 'Cloud SKUs', 'Cloud Resources', 'Services', and 'Blueprints'. Below the navigation is a breadcrumb path 'Catalog / CMP SKUs' and a link 'SKU List (0)'. A large red box highlights the 'CMP SKUs' tab, and a red arrow points to the 'SKU List (0)' link. The main area has a search bar with 'Search' and 'Search by tags' fields, and a 'Search by Service Name' field. Below the search fields, it says 'No SKUs found'. At the bottom right, there are pagination controls for 'Items per page' (set to 20), '0 of 0', and navigation arrows.

Figura 218 – Accesso a "SCMP SKU"

At the top, there is a filter section that allows searching by:

- "Search": allows entering free text for searching.
- "Search By tags": allows searching using tags associated with resources.
- "Search by Service name": allows searching by service name.

9.0.1.2.1 EXPORT OF CATALOG RESOURCES

To export the list of Catalog resources present in the list, always on the "SCMP" tab page, in the upper right corner, click on the hamburger menu, and then click on "Export".

The operator will have the option to export the list of results in .csv and/or .json format.



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Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date	Actions
Audio Analytics	AIMODEL	CMP	-	Conventional	2023-03-03	2023-03-03	⋮
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	2023-06-09	2023-06-09	⋮
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	2023-06-09	2023-06-09	⋮
Blueprint Retail	BLUEPRINT	CMP	-	Conventional	2023-06-21	2023-06-21	⋮
MyApplication	BLUEPRINT	CMP	-	Conventional	2023-01-24	2023-01-24	⋮
PaaS - AI Platform	PAAS	CMP	-	Conventional	2023-06-14	2023-06-14	⋮
PaaS - IAM	PAAS	CMP	-	Conventional	2023-06-14	2023-06-14	⋮
PaaS - Kafka	PAAS	CMP	-	Conventional	2023-06-09	2023-06-09	⋮

Figura 219 – Scaricare la lista di risultati

9.0.1.2.2 CREATING A CATALOG SKU RELATIONSHIP

To create a resource in the Catalog, always on the "SCMP" tab page, in the upper right corner, click on the hamburger menu, and then click on "Add Catalog Resource".



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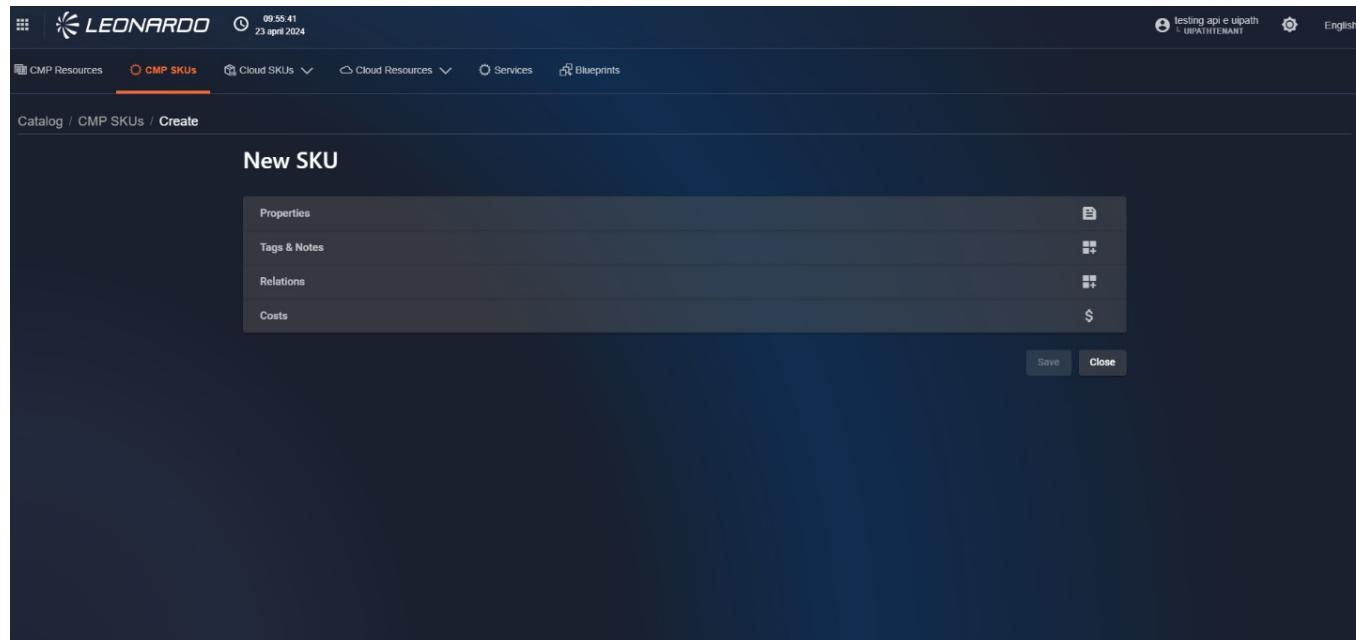
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*Figura 220 – Opzione per aggiungere
una risorsa “SKU”*

At this point, the user is on the "SKU" resource creation page. Click on the accordions on the page to view their details.



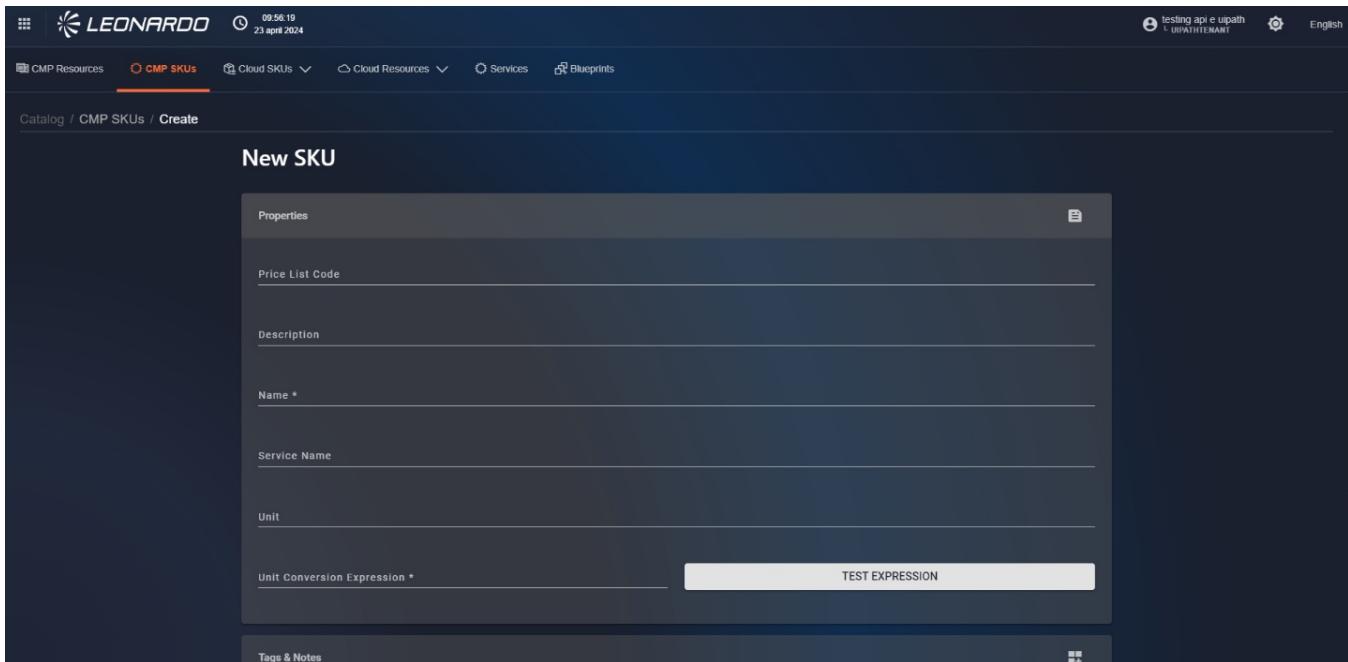
*Figura 221 – IPagina di creazione
“SKU”*

In the "Properties" section, fill in all fields defined in the table.

Mandatory parameters are indicated with *

Name	Type	Description	Example
Price list code	string	Enter the price list identifier code from which associations are derived	PRI002FG
description	string	Enter a free description of the SKU	This sku is the basic v m on this p rovider
name *	string	Enter the SKU name	Simple vm sku

Name	Type	Description	Example
Service name	string	Enter the name of the service related to the SKU	enter the service name
unit	string	Enter text that will be used as the "unit of measure" displayed across all functionalities	MB/hour
Unit conversion Expression *	string	Enter the conversion formula between the value received from the provider and the value that will be used in the SCMP (conversion between the provider's unit of measure and the unit of measure indicated in the SKU relationship) "\$var" indicates the value received from the provider	\$var * 24 / 100



The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there is a header with the Leonardo logo, a timestamp (09:56:19, 23 April 2024), and user information (testing api e upath, UPATH). Below the header, the navigation bar includes links for CMP Resources, CMP SKUs (which is the active tab), Cloud SKUs, Cloud Resources, Services, and Blueprints. The main content area is titled 'New SKU'. A modal window is open, titled 'Properties', containing fields for Price List Code, Description, Name*, Service Name, Unit, and Unit Conversion Expression*. A 'TEST EXPRESSION' button is located at the bottom right of the modal. At the bottom of the page, there is a 'Tags & Notes' section.

*Figura 222 – Compilazione dei campi,
selezione Properties*

After entering the conversion formula, it is necessary to click the "Test expression" button to verify its correctness.

If it has been entered correctly, the button will turn "Green" with "TEST OK" written on it; otherwise, it will turn "Red" with "KO". In this case, the possibility of saving the relationship is inhibited.



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The screenshot shows a dark-themed web interface for creating a new SKU. At the top, there's a navigation bar with links for 'CMP Resources', 'CMP SKUs' (which is highlighted in orange), 'Cloud SKUs', 'Cloud Resources', 'Services', and 'Blueprints'. On the far right, there are user profile and language selection options ('testing api e upath L'UPATHENANT', 'English'). Below the navigation, the path 'Catalog / CMP SKUs / Create' is shown. The main area is titled 'New SKU' and contains several input fields: 'Price List Code', 'Description', 'Name *' (marked with a red asterisk), 'Service Name', 'Unit', and 'Unit Conversion Expression *' (containing '\$var * 24'). At the bottom right of this section is a green button labeled 'TEST OK'. At the very bottom of the form is a 'Tags & Notes' section.

Figura 223 – Conferma della formula di conversione

Subsequently, select one or more tags for the "Add SCMP tag..." field and fill in notes in the "Tags & Note" section.

In the "Relation" section, it is possible to select one or more SKUs from the various provider catalogs to relate them and unify their costs. To do this, click on the "Composition" section on the left; a dark section will open where, using drag and drop, we can move the available SKUs to the right section.

In the right section, filters can be used to display only relevant results. The available filters are: the origin provider, the service name, and a free text field (in yellow in the image).



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The screenshot shows the 'Relations' section of the Secure Cloud Management Platform. At the top, there is a search bar with 'Provider' set to 'Google' and 'Service Name' set to 'SQL Server 2014 Express on H...'. Below the search bar, a list of resources is displayed, with the first item, 'Licensing Fee for Standard Plan on VM with 12 VCPU or more', highlighted by a red box. A yellow arrow points from the left towards the search bar.

Figura 224 – Drag and drop Relazioni
SKU

Once the resources are related, an illustrative diagram will automatically be created in the 'Relations Chart' section.

The screenshot shows the 'Relations Chart' section of the Secure Cloud Management Platform. It features a circular diagram with three nodes: a green circle labeled 'This Resource' at the top, and two pink circles labeled 'SKU' at the bottom. Red arrows connect 'This Resource' to each SKU node. The interface includes a legend at the top left: a green square for 'This Resource' and a pink square for 'SKU'. At the bottom right, there are 'Save' and 'Close' buttons.



Figura 225 – Creazione automatica del Relation Chart

Finally, click the save button to confirm the creation of the SKU relationship. Upon completion, you will return to the page containing the list of SKU relationships, where you can find the new relationship in the list.

9.0.1.2.3 USING THE CATALOG TABLE

9.0.1.2.3.1 Catalog Resource Summary View

To view the data of an SKU resource, in the list of resources, click on the record of interest for a resource. A checkbox will appear showing brief information about the identified resource: System, Name, Size, Update Date, name, and service as shown in the following image.

Name	Service Name	Creation Date
1 vCore - Free	SQL Database General Purpose - Serverless - Compute Gen5 - 1 vCore - Free - EU West	01/02/2024
100 RU/s	Azure Cosmos DB - 100 RU/s - US West	21/04/2024
100 RU/s	Azure Cosmos DB - 100 RU/s	21/04/2024
16 vCPU VM License	Red Hat Enterprise Linux - 5+ vCPU VM License	19/04/2024
4 vCPU VM License	Red Hat Enterprise Linux - 1-4 vCPU VM License	19/04/2024

Figura 226 – Dettaglio rapido delle risorse SKU

9.0.1.2.3.2 Viewing Relationships in the Catalog

To view the data of an SKU resource, in the list of resources, click on the kebab menu for a resource and then click on "Show".



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Name	Service Name	Creation Date
1 vCore - Free	SQL Database General Purpose - Serverless - Compute Gen5 - 1 vCore - Free - EU West	01/03/2024
100 RU/s	Azure Cosmos DB - 100 RU/s - US West	21/04/2024
100 RU/s	Azure Cosmos DB - 100 RU/s	21/04/2024
16 vCPU VM License	Red Hat Enterprise Linux - 5+ vCPU VM License	19/04/2024
4 vCPU VM License	Red Hat Enterprise Linux - 1-4 vCPU VM License	19/04/2024

Figura 227 – Accesso alla risorsa in modalità view

After doing this, the user is on the resource page in view mode, where they can see the data but cannot modify it.

Figura 228 – Dettaglio completo delle



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risorse di catalogo

The detail of a resource is divided into various sections:

- Details.
- Properties.
- Tags & Notes: where in the "Provider Tags..." field it is not possible to select a tag, as it is automatically obtained from the subsystem it belongs to; the "Add SCMP Tag..." field allows selecting tags from a list or entering one manually; in the Notes field, it is possible to enter a text note.
- Relations: where provider SKUs are present in relation.
- Cost.
- Relations Chart.

The screenshot shows a dark-themed web interface for managing catalog SKUs. At the top, there's a navigation bar with links for 'CMP Resources', 'CMP SKUs' (which is currently selected), 'Cloud SKUs', 'Cloud Resources', 'Services', and 'Blueprints'. On the right side of the header, there are user-related icons and language selection ('English'). Below the header, the main content area has a title 'Properties' and several input fields:

- Price List Code: MGDGCP020
- Description: Balanced PD
- Name: Balanced PD
- Service Name: Balanced PD
- Unit: gibibyte hour
- Unit Conversion Expression: $(\$var / 30) / 24$ (with a 'TEST EXPRESSION' button next to it)

At the bottom of the properties section, there are three collapsed sections: 'Tags & Notes', 'Relations', and 'Costs'. Each of these sections has a small '+' icon to expand them.

Figura 229 – Sezione proprietà degli elementi SKU di catalogo



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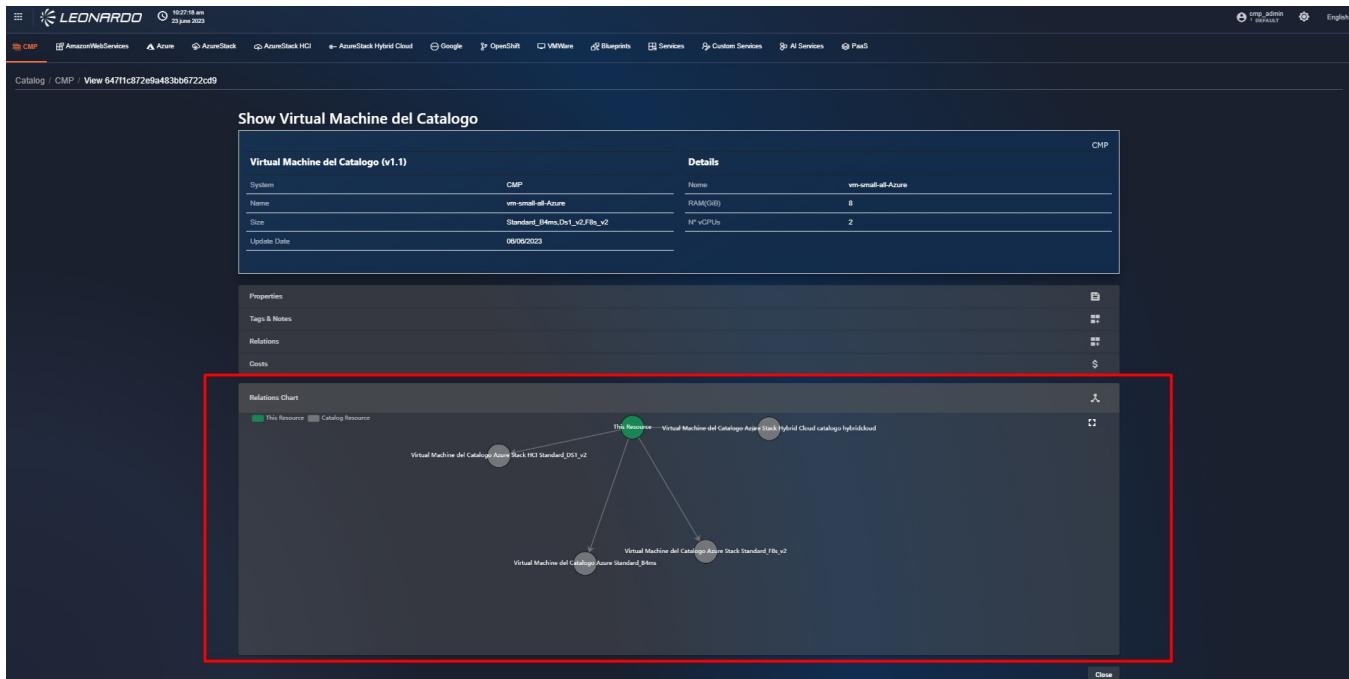
Secure Cloud Management Platform

The screenshot shows the Leonardo Secure Cloud Management Platform interface. The top navigation bar includes the Leonardo logo, a timestamp (12:15:02, 23 aprile 2024), and various menu items like CMP Resources, CMP SKUs, Cloud SKUs, Cloud Resources, Services, and Blueprints. The main content area is titled 'Catalog SKUs'. The 'Tags & Notes' tab is active, containing fields for 'Unit Conversion Expression' (set to '\$var / 30) / 24') and 'Notes', with a 'Save' button. Below this are sections for 'Relations' and 'Costs'. A 'Relations Chart' section features a green circle labeled 'This Resource' connected to a pink square labeled 'SKU'.

*Figura 230 – Sezione Tags & Note
degli elementi SKU di catalogo*

The screenshot shows the 'Relations' section of the Catalog SKUs page. It displays a 'COMPOSITION' entry for 'SKUCatalogoGoogle' with a 'Name' field and a note about 'Balanced PD Capacity in Milan'. On the right, there's a sidebar for 'Search by name' with dropdowns for 'Provider' and 'Service Name'. Below is a list of resources that can be added, such as '1 Year Starter Pack', '1 vCore - Free', and various RU/s and ARR license options.

*Figura 231 – Sezione delle relazioni
degli SKU di catalogo*



*Figura 232 – Sezione Relations Chart
delle risorse*

In the bottom right, click the "Close" button. The user will be redirected to the page containing the list of resources.

9.0.1.2.3.3 Editing Catalog Relationships

To modify an SCMP resource, on the "Resources" page of Catalog, in the list of resources, click on the kebab menu for a resource and then click on "Edit".



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The screenshot shows a web-based interface for managing cloud resources. At the top, there's a navigation bar with various service icons like CMP, AWS, Azure, Google, OpenShift, VMWare, Blueprints, Services, Custom Services, AI Services, and PaaS. Below the navigation is a header bar with 'Catalog' and 'CMP' selected. The main area displays a table of resources with columns for Name, Type, Provider, Size, Confidentiality, Provisioning on, and Creation Date. A resource named 'MyApplication' is selected, and a context menu is open next to it, showing options: Show, Edit (which is highlighted with a red box), Delete, and Instance. To the right of the table, there are two donut charts: one showing VMs and Cluster Kubernetes distribution (60% VMs, 40% Cluster Kubernetes) and another showing Conventional vs. Non-Conventional resources (Conventional is red, Non-Conventional is blue). The bottom of the screen shows pagination controls for items per page (10) and a total of 20 items.

Figura 233 – Accesso alla risorsa in modalità edit

After doing this, the user is on the resource page in edit mode. Unlike 'Show' mode, in 'Edit' mode, it is possible to modify the resource parameters.

9.0.1.2.3.4 Deleting Catalog SKU Relationships

To delete a catalog SKU resource, in the list of resources, click on the kebab menu for a resource and then click on "Delete".



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LEONARDO 10:22:42 am
20 June 2023

cmp_admin
DEFAULT
English

CMP AmazonWebServices Azure AzureStack AzureStack HCI Google OpenShift VMWare Blueprints Services Custom Services AI Services PaaS

Catalog CMP

Catalog resources (20)

Filtering by: (No filter applied yet)

Search Search by tags

Name Type Provider Size Confidential Provisioning on Creation Date

Audio Analytics	AMODEL	CMP	-	Conventional	03/03/2023	
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	09/01/2023	
MyApplication	BLUEPRINT	CMP	-	Conventional	24/01/2023	
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	
PaaS - IAM	PAAS	CMP	-	Conventional	14/06/2023	
PaaS - Kafka	PAAS	CMP	-	Conventional	09/06/2023	
PaaS - Nginx	PAAS	CMP	-	Conventional	16/05/2023	
PaaS - Spark	PAAS	CMP	-	Conventional	14/06/2023	
Pro Blueprint Edition	BLUEPRINT	CMP	-	Conventional	30/01/2023	

VMs Cluster Kubernetes

40% 60%

Conventional

Items per page: 10 | 1 – 10 of 20 | < > |

Figura 234 – Eliminazione di una risorsa SKU

Once done, a modal appears where it is necessary to click the "Remove" button to confirm the resource deletion.

The screenshot shows the Leonardo CMP interface. At the top, there's a navigation bar with links for CMP, AmazonWebServices, Azure, AzureStack, AzureStack HCI, Google, OpenShift, VMWare, Blueprints, Services, Custom Services, AI Services, and PaaS. The top right corner shows user information for 'cmp_admin' and 'DEFAULT'.

The main area is titled 'Catalog / CMP'. Below it, a sub-section titled 'Catalog resources (20)' is shown. A search bar and a 'Search by tags' bar are available. A message 'Filtering by: (No filter applied yet)' is displayed.

A modal window titled 'Remove resource' is open over the resource list. It contains the message: 'IMPORTANT: Removing this resource problems to other linked resources could happen. Are you sure you really want to remove the resource Audio Analytics?'. It has 'Cancel' and 'Remove' buttons. To the right of the modal, there's a pie chart with two segments: 40% (green) and 60% (blue), labeled 'Cluster Kubernetes'.

Name	Type					
Audio Analytics	AIMODEL	CMP	-	Conventional	09/01/2023	⋮
BLUEPRINT DEMO	BLUEPRINT	CMP	-	Conventional	09/01/2023	⋮
Blueprint DEMO path	BLUEPRINT	CMP	-	Conventional	24/01/2023	⋮
MyApplication	BLUEPRINT	CMP	-	Conventional	14/06/2023	⋮
PaaS - AI Platform	PAAS	CMP	-	Conventional	14/06/2023	⋮
PaaS - IAM	PAAS	CMP	-	Conventional	09/06/2023	⋮
PaaS - Kafka	PAAS	CMP	-	Conventional	09/06/2023	⋮

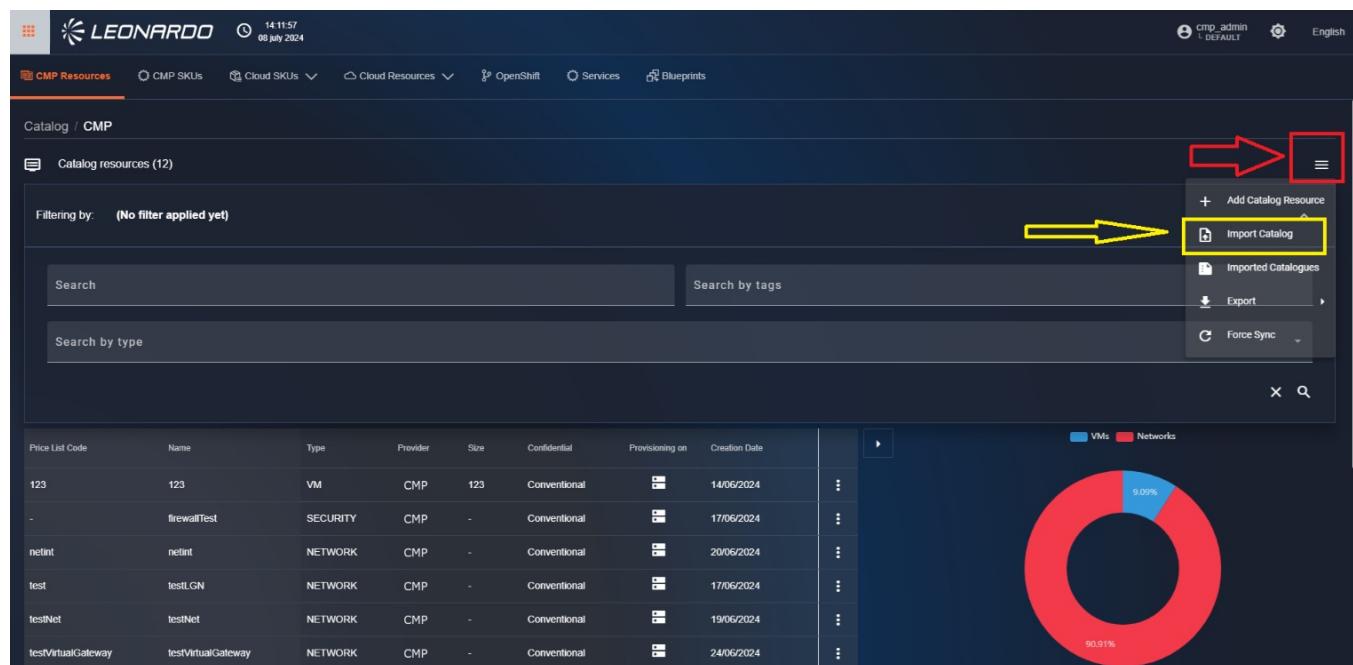
Figura 235 – Conferma eliminazione della risorsa

9.0.1.3 Scheduled Import of Catalog Items

Manually entering catalog resources is a very long and costly operation. To simplify this, the user is given the possibility to insert an "Excel" file containing data that will then be automatically imported on the day indicated as "Start validity".

9.0.1.3.1 NEW IMPORT

To insert a new price list, it is necessary to click the "hamburger menu" available in the upper right corner of the catalog resources page and select "Import Catalogue".



The screenshot shows the Leonardo Secure Cloud Management Platform interface. The top navigation bar includes the Leonardo logo, a date and time indicator (14:11:57, 08 July 2024), and user information (cmp_admin, DEFAULT). Below the header, there are several navigation links: CMP Resources, CMP SKUs, Cloud SKUs, Cloud Resources, OpenShift, Services, and Blueprints. The main content area is titled 'Catalog / CMP' and shows 'Catalog resources (12)'. It features a search bar, a 'Search by type' dropdown, and a filtering section that says '(No filter applied yet)'. On the right side, there is a sidebar with a 'More' icon (three horizontal dots) and a list of actions: 'Add Catalog Resource' (button), 'Import Catalog' (button, highlighted with a yellow box and a yellow arrow pointing to it), 'Imported Catalogues' (link), 'Export' (link), and 'Force Sync' (link). Below the sidebar, there is a table listing catalog resources with columns: Price List Code, Name, Type, Provider, Size, Confidential, Provisioning on, and Creation Date. The table contains entries like '123', 'firewallTest', 'netint', 'test', 'testNet', and 'testVirtualGateway'. At the bottom right of the main area, there is a donut chart showing resource distribution: 90.91% for Networks and 9.09% for VMs.

Figura 236 – Accesso all "Importazione pianificata del catalogo"

After clicking the button, a modal will open, containing two buttons:

- "Resources": clicking this button indicates to the system that the inserted price list will contain resources.
- "SKUs": clicking this button indicates to the system that the inserted price list will contain SKU items.

Once the resource type to be created is selected, the page updates to show all mandatory parameters.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for CMP Resources, GMP SKUs, Cloud SKUs, Cloud Resources, OpenShift, Services, and Blueprints. The main area is titled 'Catalog' and shows 'Catalog resources (12)'. A modal window titled 'Import Catalog' is open, prompting the user with 'What do you want to import?'. Below the modal, there's a table with columns: Price List Code, Name, Type, Provider, Size, Confidential, Provisioning on, and Creation Date. The table contains several entries, including '123' (VM), 'firewallTest' (SECURITY), 'netint' (NETWORK), 'test' (NETWORK), 'testNet' (NETWORK), and 'testVirtualGateway' (NETWORK). To the right of the table is a donut chart showing resource distribution: 9.09% for VMs and 90.91% for Networks.

Price List Code	Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date
123	123	VM	CMP	123	Conventional	...	14/06/2024
-	firewallTest	SECURITY	CMP	-	Conventional	...	17/06/2024
netint	netint	NETWORK	CMP	-	Conventional	...	20/06/2024
test	testLGN	NETWORK	CMP	-	Conventional	...	17/06/2024
testNet	testNet	NETWORK	CMP	-	Conventional	...	19/06/2024
testVirtualGateway	testVirtualGateway	NETWORK	CMP	-	Conventional	...	24/06/2024

Figura 237 – Scelta della tipologia di catalogo

Two parameters are present in the modal:

- Provider: Select the provider related to the price list that will be inserted.
- Valid From: It is possible to indicate a start validity date for the price list. On the day indicated in this variable, the system will automatically update the catalog resources to conform to the new price list.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. A modal window titled "Import Catalog" is open, prompting the user to "What do you want to import?". It has two tabs: "Resources" (selected) and "SKUs". Below the tabs are fields for "Provider" and "Valid from". A note says "Please provide at least the catalog file. It's possible to provide also a mapping file to fine-tune the parsing." Two upload fields are shown: "Catalog File" and "Mapping File", each with a "Upload File" button. In the background, a table titled "Catalog / CMP" displays "Catalog resources (12)". The table columns include Price List Code, Name, Type, Provider, Creation Date, and Last Update. Examples of resources listed are 123 (VM), firewallTe (NETWORK), netInt (NETWORK), test (NETWORK), testNet (NETWORK), and testVirtualGateway (NETWORK).

Figura 238 – Campi obbligatori per l'importazione

Furthermore, below the parameters, there are two sections for file upload. Clicking on the first square on the left will allow selecting an "XLS" file containing all the resources to be mapped. Clicking on the second square will allow inserting a mapping file, following the information shown in the "Help" section indicated with a "Question Mark" icon. Clicking on it will open a box, below the upload sections, containing all the information related to the mapping file to be inserted.



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Import Catalog

Please provide at least the catalog file. It's possible to provide also a mapping file to fine-tune the parsing.

Catalog File

Mapping File

Upload File

Search

Mapping file has to be a csv and must contain the following columns of the catalog:

- name
- providerCode
- description
- price
- unit
- serviceName

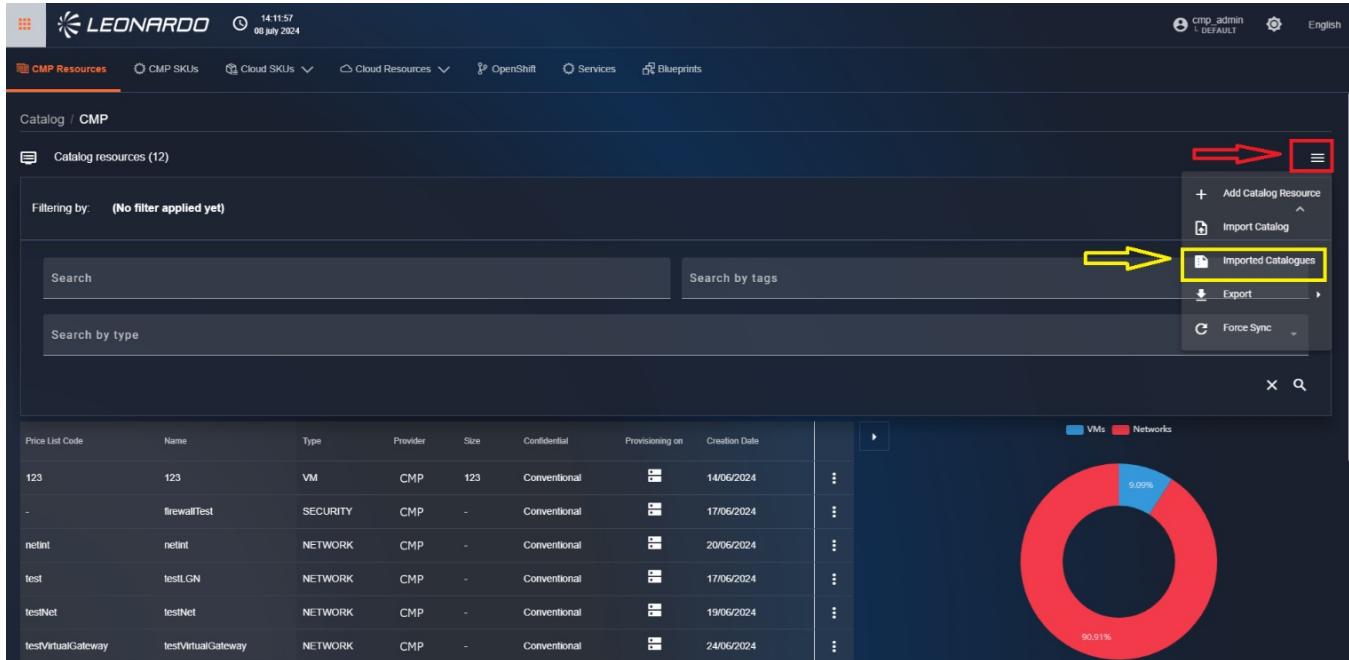
Put a column in every row and specify which column of the catalog matches using a ';' as separator. For example:
unit;Unità di Misura

Figura 239 – Messaggio di aiuto per il file di Mapping

After entering all parameters, it will be possible to click the save button at the bottom, and we will be redirected to the imported catalogs management page, where it will be possible to monitor their insertion.

9.0.1.3.2 IMPORT MANAGEMENT

To insert a new price list, it is necessary to click the "hamburger menu" available in the upper right corner of the catalog resources page and select "Imported Catalogues".



The screenshot shows the Leonardo Secure Cloud Management Platform's Catalog resources page. At the top, there are navigation links for CMP Resources, CMP SKUs, Cloud SKUs, Cloud Resources, OpenShift, Services, and Blueprints. The main area displays a table of catalog resources with columns for Price List Code, Name, Type, Provider, Size, Confidential, Provisioning on, and Creation Date. Below the table is a donut chart showing the distribution between VMs (9.09%) and Networks (90.91%). On the right side, there is a sidebar with options for Add Catalog Resource, Import Catalog, Export, and Force Sync. A yellow arrow points to the 'Import Catalogues' button, which is highlighted with a yellow box. Another red arrow points to the 'Import Catalog' button.

Price List Code	Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date	Actions
123	123	VM	CMP	123	Conventional	14/06/2024		⋮
-	firewallTest	SECURITY	CMP	-	Conventional	17/06/2024		⋮
netint	netint	NETWORK	CMP	-	Conventional	20/06/2024		⋮
test	testLGN	NETWORK	CMP	-	Conventional	17/06/2024		⋮
testNet	testNet	NETWORK	CMP	-	Conventional	19/06/2024		⋮
testVirtualGateway	testVirtualGateway	NETWORK	CMP	-	Conventional	24/06/2024		⋮

Figura 240 – Accesso ai cataloghi importati

The user will then be redirected to the page containing all previously imported catalogs. On this page, for each row, which corresponds to an Upload, it is possible to delete the file by clicking the "Three dots" button corresponding to the row and clicking "Delete" to remove it.

Catalogs can have 3 different states:

- Deleted: indicates that the file has been replaced with a subsequent version.
- Success: indicated with a green icon, indicates that the catalog is ready and will be used starting from the indicated day.
- In progress: indicated with a yellow icon, indicates that the system is checking the validity of the entered information.

On this page, we can also note that uploads made with the same file are saved using versions, so when an already existing catalog is inserted, it will be overwritten with a higher version, and previous versions will be deactivated.



File Name	Provider	Valid from	Creation Date	Last update	Version	Status	Validity
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx	Oracle	17/06/2024	27/06/2024 16:56:15	27/06/2024 16:56:15	4	(1)	✓
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx.xlsx	Oracle	17/06/2024	27/06/2024 16:50:15	27/06/2024 16:50:16	3	Deleted	✗
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx.xlsx	Oracle	17/06/2024	27/06/2024 16:49:36	27/06/2024 16:49:36	2	Deleted	✗
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx.xlsx	Oracle	27/06/2024	27/06/2024 18:09:42	27/06/2024 18:09:42	2	✓	✓
PSN_SPC_Azure_Listino_asof 20240327_v0.1 (1).xlsx	Azure	27/06/2024	27/06/2024 14:45:56	27/06/2024 14:45:56	1	Deleted	✗
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx	Oracle	17/06/2024	27/06/2024 16:49:24	27/06/2024 16:49:25	1	Deleted	✗
PSN_SPC_Azure_Listino_asof 20240327_v0.1.xlsx	Azure	01/07/2024	01/07/2024 09:24:56	01/07/2024 09:24:56	1	Deleted	✗
PSN_SPC_Azure_Listino_tests.xlsx	Azure	05/07/2024	05/07/2024 15:12:14	05/07/2024 15:12:14	1	✓	✓
PSN - TIM - Espansione Managed ORACLE - v11b to PSN.xlsx	Oracle	26/06/2024	26/06/2024 17:30:56	26/06/2024 17:30:56	0	Deleted	✗
PSN - TIM - Espansione Managed ORACLE - v11b to PSN - Copia.xlsx	Oracle	26/06/2024	26/06/2024 17:39:05	26/06/2024 17:39:05	0	Deleted	✗
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx	Oracle	27/06/2024	27/06/2024 08:08:31	27/06/2024 08:08:31	0	Deleted	✗
PSN_SPC_Azure_Listino_tests.xlsx	Azure	27/06/2024	27/06/2024 11:05:46	27/06/2024 11:05:46	0	Deleted	✗
PSN_SPC_Azure_Listino_asof 20240327_v0.1.xlsx	Azure	27/06/2024	27/06/2024 14:35:09	27/06/2024 14:35:10	0	Deleted	✗
PSN_SPC_Azure_Listino_asof 20240327_v0.1.xlsx	Azure	27/06/2024	27/06/2024 14:58:32	27/06/2024 14:58:32	0	Deleted	✗

Figura 241 – Lista dei cataloghi importati

Clicking on a "Success" row in the table will open a modal. Inside, we can view a summary that contains, in addition to basic information, the number of elements, called "rows", that were found in the Excel file.

The rows available in the file can have 3 different states:

- Associated Rows: indicates that the system is able to both create the resource and associate it with a provider catalog size, allowing its use during provisioning.
- Success Rows: indicates that the system is able to create the resource but cannot establish a relationship with a provider resource.
- Failed Rows: indicates that the system cannot insert the resource.



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The screenshot shows the LEONARDO CMP Admin interface. The top navigation bar includes the LEONARDO logo, user information (cmp_admin, DEFAULT), and system status (14:58:53, 08 July 2024). Below the navigation is a secondary header with links for CMP Resources, CMP SKUs, Cloud SKUs, Cloud Resources, OpenShift, Services, and Blueprints. The main content area displays a table of imported catalogues. A modal window titled "Import Catalog Report" is overlaid on the table, containing summary information about the import process. A red arrow points to a "More details" button within this modal.

File Name	Provider	Valid from	Creation Date	Last update	Version	Status	Validity	...
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx	Oracle	17/06/2024	27/06/2024 16:56:15	27/06/2024 16:56:15	4	🟡	🟢	...
PSN - TIM - Espansione
PSN - TIM - Espansione
PSN - TIM - Espansione
PSN_SPC Azure_Listino
PSN - TIM - Espansione
PSN_SPC Azure_Listino
PSN_SPC Azure_Listino
PSN - TIM - Espansione Managed ORACLE - v11b to PSN.xlsx	Oracle	26/06/2024	26/06/2024 17:30:56	26/06/2024 17:30:56	0	Deleted	🔴	...
PSN - TIM - Espansione Managed ORACLE - v11b to PSN - Copia.xlsx	Oracle	26/06/2024	26/06/2024 17:39:05	26/06/2024 17:39:05	0	Deleted	🔴	...
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx	Oracle	27/06/2024	27/06/2024 08:08:31	27/06/2024 08:08:31	0	Deleted	🔴	...
PSN_SPC Azure_Listino_tests.xlsx	Azure	27/06/2024	27/06/2024 11:05:46	27/06/2024 11:05:46	0	Deleted	🔴	...
PSN_SPC Azure_Listino_asof 20240327_y0.1.1.xlsx	Azure	27/06/2024	27/06/2024 14:35:09	27/06/2024 14:35:10	0	Deleted	🔴	...
PSN_SPC Azure_Listino_asof 20240327_y0.1.xlsx	Azure	27/06/2024	27/06/2024 14:58:32	27/06/2024 14:58:32	0	Deleted	🔴	...

Import Catalog Report

File Name	Status	Associated Rows
PSN - TIM - Espansione Managed ORACLE - v11b to PSN (version 1).xlsx	Success	16
Provider	Import Type	Success Rows
Oracle	SKUs	196
Validity	Creation Date	Failed Rows
🟢	27/06/2024 18:09:42	31
	Last update	Total Rows
	27/06/2024 18:09:42	227

No error found in the import process.

More details

Figura 242 – Dettagli dell' importazione

At the bottom, we can click the "More Details" button to view the details of the Excel file rows that were discarded by the system. Clicking on one of them allows us to view the row number, the name indicated in the file, and the error that prevented its insertion.



Figura 243 – Dettagli delle righe dell'importazione

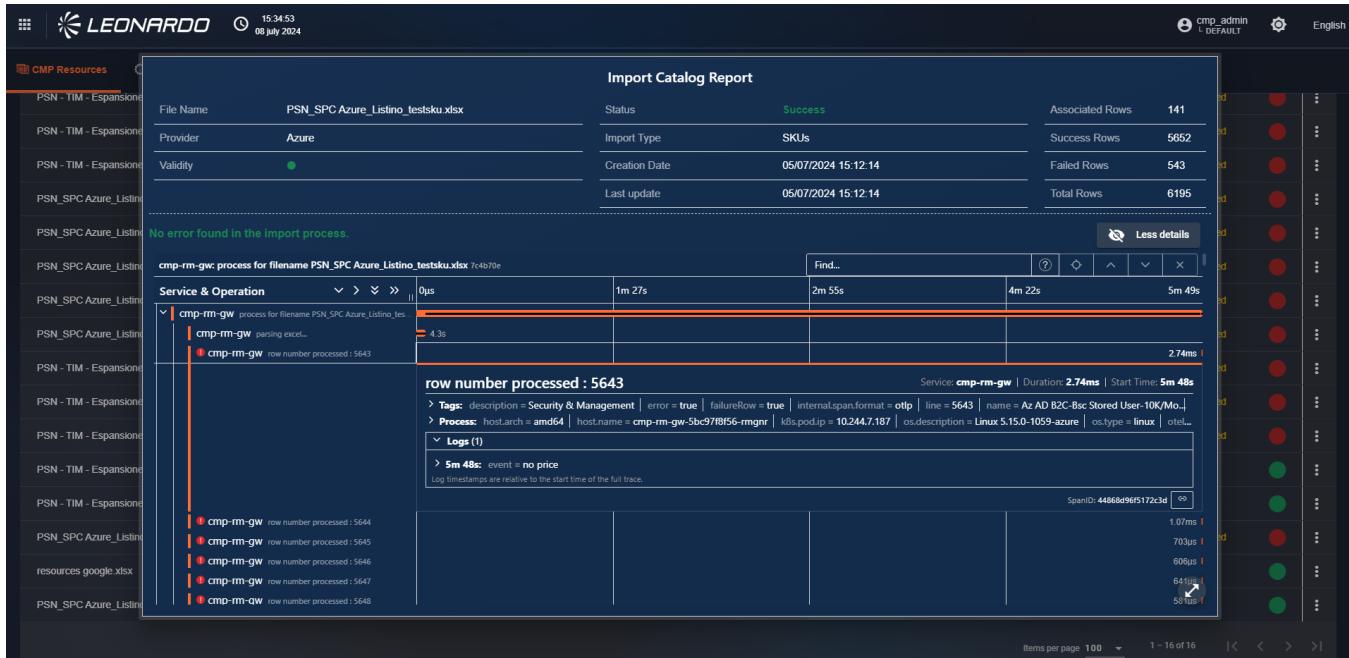


Figura 244 – Dettaglio dell' errore

9.0.2 Provider Catalog Item Management

Within the Catalog Module, it is possible to view the list and details of the "sizes" available on the various providers configured on the SCMP for both individual resources (VM, STORAGE, NETWORK, SECURITY) and resource groups "SKU".

9.0.2.1 Resources

To view the list of resources available for a provider, select the "Cloud resources" menu (in red in the image) at the top and select one of the available providers (in yellow in the image). The functionalities available on the pages of the different providers are identical.



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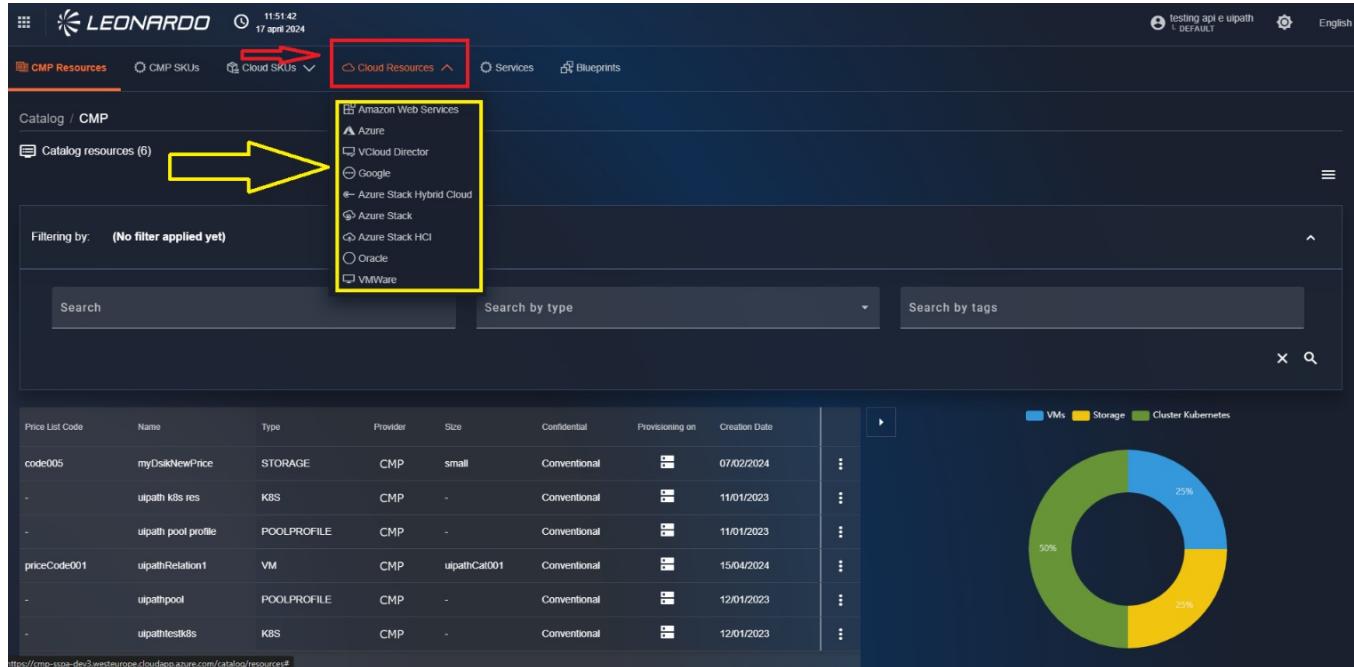


Figura 245 – Risorse del catalogo dei providers

9.0.2.1.1 EXPORT OF PROVIDER SIZES

To export the list of Catalog resources displayed on the page, in the upper right corner, click on the hamburger menu, and then click on "Export".

The operator will have the option to export the list of results in .csv and/or .json format.

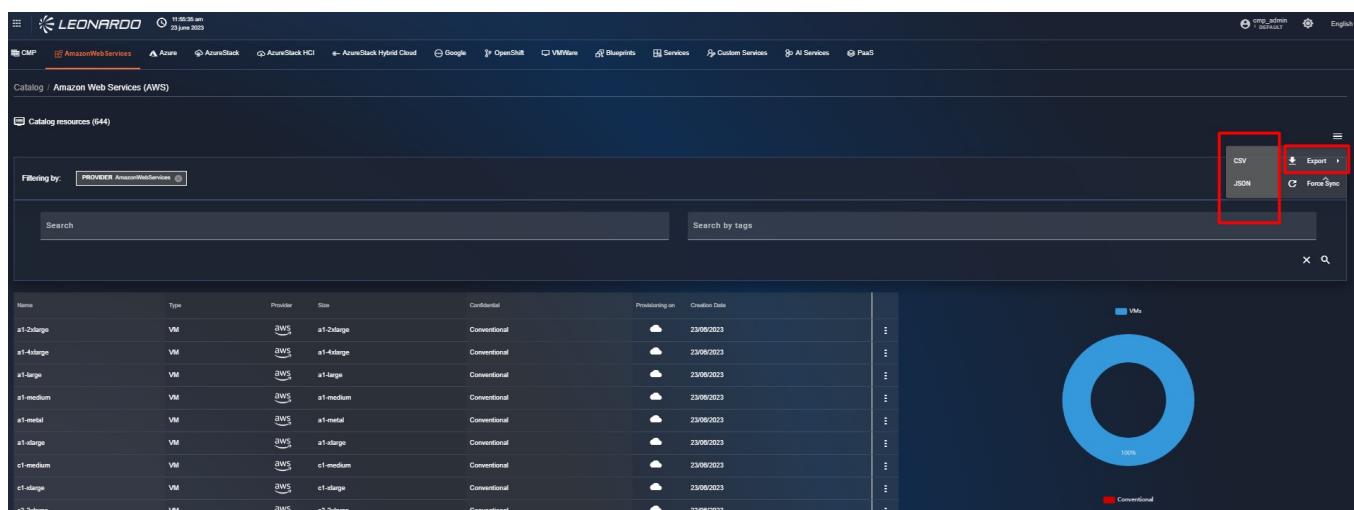


Figura 246 – Esportazione dei risultati



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9.0.2.1.2 FORCED CATALOG AND COST UPDATE FUNCTIONALITY

It is possible to force the system so that, after a few minutes, all "sizes" and their associated costs are automatically updated. To do this, click on the hamburger menu in the upper right corner, and then click on "Force Sync".

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for CMP, AmazonWebServices, Azure, AzureStack, AzureStack HCI, AzureStack Hybrid Cloud, Google, OpenShift, VMware, Blueprints, Services, Custom Services, AI Services, and PaaS. Below the navigation is a breadcrumb trail: Catalog / Amazon Web Services (AWS). The main area is titled 'Catalog resources (644)'. It features a search bar with 'Search' and 'Search by tags' fields, and a filter section with 'Filtering by: PROVIDER AmazonWebServices'. On the right side of the search bar, there's a 'Force Sync' button with a red box around it. Below the search bar is a table listing 10 VM resources from AWS, including columns for Name, Type, Provider, Size, Confidential, Provisioning on, and Creation Date. To the right of the table is a donut chart showing 100% for VMs and 0% for Conventional. At the bottom of the screenshot, there's a legend indicating that blue represents VMs and red represents Conventional.

Figura 247 – Funzionalità Force Sync

9.0.2.1.3 RESOURCE FILTERS

The user is given the possibility to filter the displayed resource lists. At the top of the page, there is a filter section. The available filters are:

- "search": allows searching for resources with free text.
- "search by type": allows searching for resources of a specific type only.
- "search by tags" allows searching for all resources containing a specific tag.

After entering one or more filters, click the "magnifying glass" button to perform the search.



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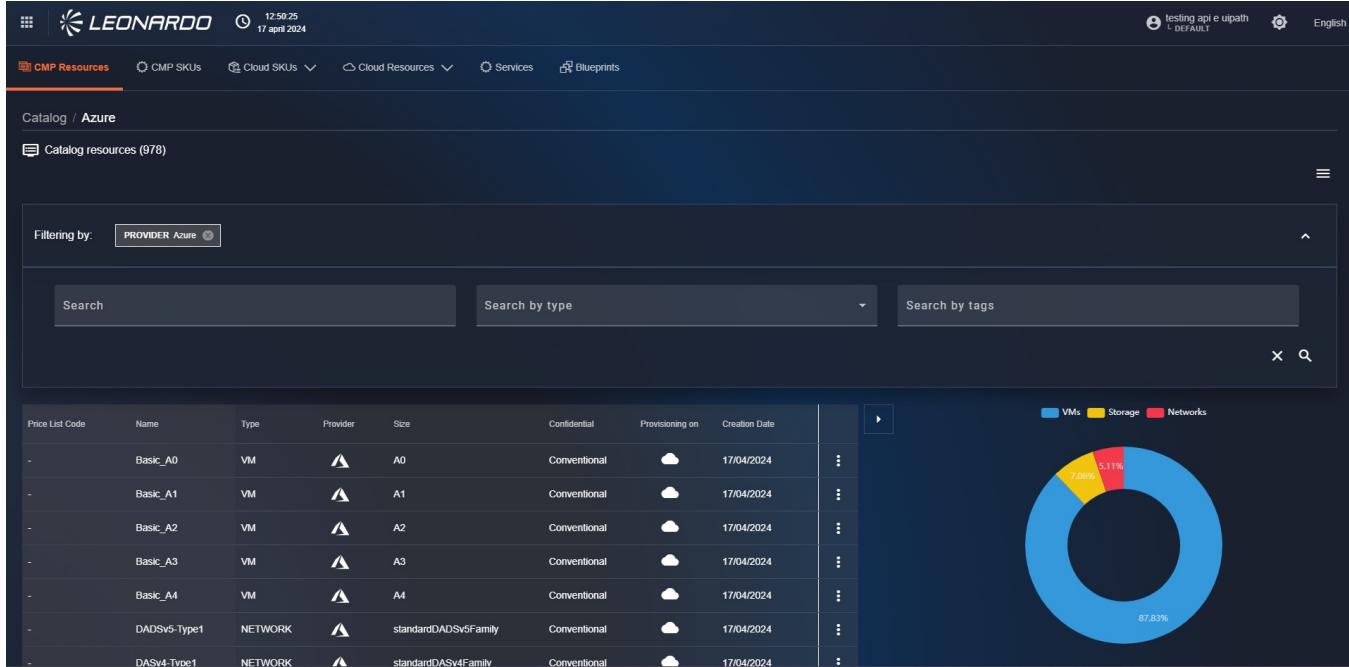


Figura 248 – Filtri del Catalogo

9.0.2.1.4 RESOURCE SUMMARY VIEW

To view a preview of a resource, click on the record of interest for a resource. A modal will appear showing the general information of the identified resource, including: System, Name, Size, Update Date, RAM, and CPU as shown in the following image.

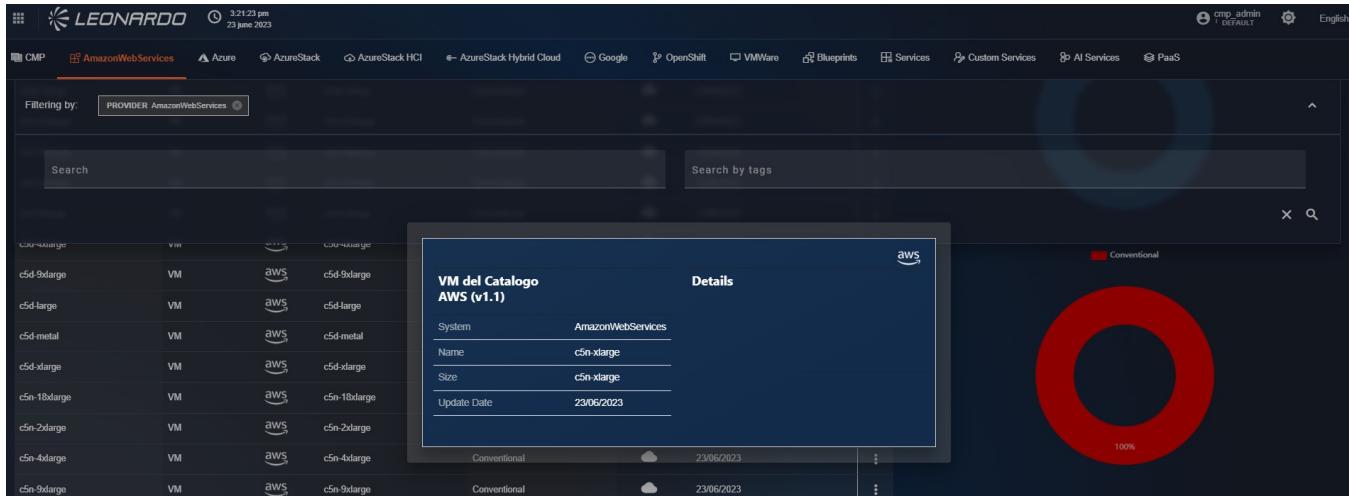


Figura 249 – Dettaglio rapido delle risorse di catalogo



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9.0.2.1.5 VIEWING RESOURCE DETAILS

To view the data of a resource, click on the kebab menu for a resource and then click on "Show". After

Name	Type	Provider	Size	Confidential	Positioning on	Creation Date	Actions
a1-2xlarge	VM	aws	a1-2xlarge	Conventional		23/06/2023	⋮ ⚡ Show ⋮
a1-4xlarge	VM	aws	a1-4xlarge	Conventional		23/06/2023	⋮ ⚡ Show ⋮
a1-large	VM	aws	a1-large	Conventional		23/06/2023	⋮ ⚡ Show ⋮
a1-medium	VM	aws	a1-medium	Conventional		23/06/2023	⋮ ⚡ Show ⋮
a1-metal	VM	aws	a1-metal	Conventional		23/06/2023	⋮ ⚡ Show ⋮
a1-xlarge	VM	aws	a1-xlarge	Conventional		23/06/2023	⋮ ⚡ Show ⋮
c1-medium	VM	aws	c1-medium	Conventional		23/06/2023	⋮ ⚡ Show ⋮
c1-large	VM	aws	c1-large	Conventional		23/06/2023	⋮ ⚡ Show ⋮
c3-2xlarge	VM	aws	c3-2xlarge	Conventional		23/06/2023	⋮ ⚡ Show ⋮
c3-4xlarge	VM	aws	c3-4xlarge	Conventional		23/06/2023	⋮ ⚡ Show ⋮

A circular chart on the right shows 100% utilization for VMs, with a legend indicating Conventional (red).

Figura 250 – Accesso alla risorsa in modalità view

doing this, the user is on the resource page in view mode, where they can see the data but cannot modify it.

Show VM del Catalogo AWS

VM del Catalogo AWS (v1.1)		Details
System	AmazonWebServices	
Name	a1-2xlarge	
Size	a1-2xlarge	
Update Date	23/06/2023	

Properties, Tags & Notes, Costs tabs are visible at the bottom.

Figura 251 – Dettaglio Risorsa dal Modulo Catalog

The detail of a resource is divided into various sections:

- Details



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- Properties
- Tags & Notes
- Cost

In the Cost section, it is possible to sequentially select the Region, Zone, and Cost type to obtain a preview of the costs related to the selected resource.

The screenshot shows a detailed view of a virtual machine entry from the AWS catalog. The main card displays basic information like System (AmazonWebServices), Name (a1-2xlarge), Size (a1-2xlarge), and Update Date (23/06/2023). Below this, a 'Costs' section is highlighted with a red box. It includes dropdown menus for Region (US East (N. Virginia)), Zone (Us-east-1b), and Cost Type (Reservation - Linux \$0.13 / 1 Hour). There are also tabs for Properties and Tags & Notes, and a 'Close' button at the bottom right.

Figura 252 – Sezione costi della risorsa

In the bottom right, click the "Close" button to return to the list.

9.0.2.2 “On-Premise” Resources

The management of resource catalogs in on-premise systems varies significantly, being specific to each system. In some cases, the catalog functionality is absent, while in others, it is available but does not allow automatic retrieval of resources.

The user is given the possibility to define a personalized "Cloud" catalog directly in the SCMP. In this way, it will then be possible to add the created resources to the relationships of "SCMP Catalog" resources.

To do this, it is first necessary to access the catalog resources tab of an on-premise provider. Specifically, we take "VMWare" as an example by selecting "VMWare" in the "Cloud resources" menu of the catalog module.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for 'CMP Resources', 'CMP SKUs', 'Cloud SKUs', 'Cloud Resources' (which is currently selected and highlighted with a red box), 'Services', and 'Blueprints'. Below the navigation is a sidebar titled 'Catalog / CMP' with a section for 'Catalog resources (28)'. A 'Filtering by' dropdown shows '(No filter applied yet)'. The main content area has a search bar with 'VMWare' typed in, also highlighted with a red box. To the right of the search bar is a 'Search by tags' field. Below these are two tabs: 'Search by type' and a date range selector ('15.04.24 - 16.04.24'). The main table lists catalog resources with columns for 'Price List Code' and 'Name'. The table includes entries like '123', 'n2-standard-4', 'n2d-highcpu-8', 'c2-standard-16', 'c2-standard-8', and 'e2-standard-2'. To the right of the table is a donut chart showing resource distribution: 72.22% for VMs (blue) and 27.78% for Networks (red). The bottom right corner of the interface has a large 'N/A' placeholder.

Figura 253 – Accesso al catalogo On-premise

On the page, in the upper right, above the filter bar, we find a contextual menu. Click on the "Three lines" icon and select "Add catalog resource". In this way, we will be redirected to the provider-specific page for creating the catalog resource.

This screenshot shows the same Leonardo interface but with a different URL in the address bar: 'Catalog / VMWare'. The left sidebar now shows 'Catalog / VMWare' and 'Catalog resources (0)'. The search bar contains 'PROVIDER VMWare'. On the right side, there's a contextual menu with options: '+ Add Catalog Resource' (highlighted with a red box), 'CSV', 'JSON', 'Export', and 'Force Sync'. Below the search bar is a 'Search by tags' field. The main content area displays a message 'No results found'. At the bottom, there's a pagination control with 'Items per page 20' and a dashed circle placeholder with 'N/A' in the center.



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Figura 254 – Creazione nuova risorsa

At this point, the user is on the page where they can select the type of resource to create.

Figura 255 – Selezione del tipo di risorsa da creare

From the dropdown menu, select the type of resource to create. Then, click the "Next" button. You will be on the resource compilation page.

Figura 256 – Esempio di form per la creazione di una risorsa



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On this page, after opening the available sections, enter all necessary parameters. In the "Cost" section at the bottom, it will be possible to add a customized price to associate with the resource. To do this, you need to select the billing interval (hourly, daily, weekly, monthly) and enter the cost related to the selected period on the right.

The screenshot shows a dark-themed web interface for creating a new resource. At the top, there's a header with the Leonardo logo, the date '23 aprile 2024', and some user information. Below the header, a navigation bar includes links for 'CMP Resources' (which is highlighted in orange), 'Cloud SKUs', 'Cloud Resources', 'Services', and 'Blueprints'. The main content area has a title 'New resource Virtual Machine del Catalogo'. On the left, there are three tabs: 'Properties', 'Tags & Notes', and 'Relations'. The 'Properties' tab is active. On the right, under the 'Costs' section, there's a dropdown menu with options: 'Hourly' (selected), 'Daily', 'Weekly', and 'Monthly'. Next to the dropdown is a text input field containing '€100'. At the bottom right of this section are 'Save' and 'Close' buttons.

Figura 257 – Sezione costi delle risorse

9.0.2.3 Cloud SKU

To view the list of SKUs available for a provider, select the "Cloud SKU" menu (in red in the image) at the top and select one of the available providers (in yellow in the image). The functionalities available on the pages of the different providers are identical.



Filtering by: (No filter applied yet)

Search Search by type Search by tags

Price List Code	Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date
priceCode001	uipathRelation1	VM	CMP	uipathCat001	Conventional	16/04/2024	

Items per page: 20 | 1 - 1 of 1 | < < > >|

VMs 100%

Figura 258 – Risorse del catalogo dei providers

9.0.2.3.1 EXPORT OF AVAILABLE PROVIDER SIZES

To export the list of Catalog resources displayed on the page, in the upper right corner, click on the hamburger menu, and then click on "Export".

The operator will have the option to export the list of results in .csv and/or .json format.

Filtering by: PROVIDER AmazonWebServices

Search Search by tags

Name	Type	Provider	Size	Confidential	Provisioning on	Creation Date
a1-2xlarge	VM	AWS	a1-2xlarge	Conventional	Cloud	23/06/2023
a1-4xlarge	VM	AWS	a1-4xlarge	Conventional	Cloud	23/06/2023
a1-large	VM	AWS	a1-large	Conventional	Cloud	23/06/2023
a1-medium	VM	AWS	a1-medium	Conventional	Cloud	23/06/2023
a1-metal	VM	AWS	a1-metal	Conventional	Cloud	23/06/2023
a1-xlarge	VM	AWS	a1-xlarge	Conventional	Cloud	23/06/2023
c1-medium	VM	AWS	c1-medium	Conventional	Cloud	23/06/2023
c1-large	VM	AWS	c1-large	Conventional	Cloud	23/06/2023
cr1-2xlarge	VM	AWS	cr1-2xlarge	Conventional	Cloud	23/06/2023

VMs 100% Conventional

Figura 259 – Esportazione dei risultati



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9.0.2.3.2 FORCED CATALOG UPDATE FUNCTIONALITY

It is possible to force the system so that, after a few minutes, all "sizes" and their associated costs are automatically updated. To do this, click on the hamburger menu in the upper right corner, and then click on "Force Sync".

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for CMP, AmazonWebServices, Azure, AzureStack, AzureStack HCI, AzureStack Hybrid Cloud, Google, OpenShift, VMware, Blueprints, Services, Custom Services, AI Services, and PaaS. Below the navigation is a breadcrumb trail: Catalog / Amazon Web Services (AWS). The main area is titled 'Catalog resources (644)'. It features a search bar with 'Search' and 'Search by tags' fields, and a filter section with 'Filtering by: PROVIDER AmazonWebServices'. On the right side of the search bar, there's a 'Force Sync' button, which is highlighted with a red box. Below the search bar is a table listing 10 VM resources from AWS, including columns for Name, Type, Provider, Size, Confidential, Provisioning on, and Creation Date. To the right of the table is a circular progress chart with a blue circle and a red segment at the bottom labeled 'Conventional'. At the bottom of the page, there's a large blue circular icon with '100%' written on it.

Figura 260 – Funzionalità Force Sync

9.0.2.3.3 FILTERS FOR DISPLAYED RESOURCES

The user is given the possibility to filter the displayed resource lists. At the top of the page, there is a filter section. The available filters are:

- "search": allows searching for resources with free text.
- "search by Service name": allows searching for resources related to a specific service type only.
- "search by tags" allows searching for all resources containing a specific tag. After entering one or more filters, click the "magnifying glass" button to perform the search.



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Name	Service Name	Creation Date
100 RU/s	Azure Cosmos DB - 100 RU/s	17/04/2024
100 RU/s	Azure Cosmos DB - 100 RU/s - US West	17/04/2024
16 vCPU VM License	Red Hat Enterprise Linux - 5+ vCPU VM License	17/04/2024
4 vCPU VM License	Red Hat Enterprise Linux - 1-4 vCPU VM License	17/04/2024
8 vCPU VM License	Red Hat Enterprise Linux - 5+ vCPU VM License	17/04/2024

Figura 261 – Filtri del Catalogo

9.0.2.3.4 CATALOG RESOURCE SUMMARY VIEW

To view a preview of a resource, click on the record of interest for a resource. A modal will appear showing the general information of the identified resource, including: System, Name, Size, Update Date, service name.

Name	Service Name	Creation Date
100 RU/s	Azure Cosmos DB - 100 RU/s	17/04/2024
100 RU/s	Azure Cosmos DB - 100 RU/s - US West	17/04/2024
16 vCPU VM License	Red Hat Enterprise Linux - 5+ vCPU VM License	17/04/2024
4 vCPU VM License	Red Hat Enterprise Linux - 1-4 vCPU VM License	17/04/2024
8 vCPU VM License	Red Hat Enterprise Linux - 5+ vCPU VM License	17/04/2024



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Figura 262 – Dettaglio rapido delle risorse di catalogo

9.0.2.3.5 VIEWING RESOURCE DETAILS IN THE CATALOG

To view the data of a resource, click on the kebab menu for a resource and then click on "Show". After doing this, the user is on the resource page in view mode, where they can see the data but cannot modify it.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. The top navigation bar includes links for CMP, AmazonWebServices, Azure, AzureStack, AzureStack HCI, AzureStack Hybrid Cloud, Google, OpenShift, VMWare, Blueprints, Services, Custom Services, AI Services, and PaaS. The main title is 'Catalog / Amazon Web Services (AWS)'. Below the title, there's a search bar and a 'Search by tags' input field. A table lists various AWS VM instances with columns for Name, Type, Provider, Size, Confidentiality, Provisioning on, Creation Date, and a kebab menu. One row for an 'a1-2xlarge' instance has its kebab menu open, with the 'Show' option highlighted by a red box. To the right of the table is a circular chart showing 100% VM usage, with a legend indicating 100% for Conventional.

Figura 263 – Accesso alla risorsa in modalità view

The screenshot shows the Leonardo Secure Cloud Management Platform interface for viewing Google SKUs. The top navigation bar includes links for CMP Resources, CMP SKUs, Cloud SKUs, Cloud Resources, Services, and Blueprints. The main title is 'Catalog / Google SKUs / View 661c77076979355c49a0fc4'. Below the title, the heading is 'Show Sku del Catalogo Google'. A modal dialog titled 'Sku del Catalogo Google (v1.1)' is open, showing details for a '1 Year Starter Pack' service named 'MongoDB Atlas Starter'. The dialog has tabs for 'Properties' (selected), 'Tags & Notes', and 'Costs'. A 'Close' button is at the bottom right of the dialog.



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Figura 264 – Dettaglio Risorsa dal Modulo Catalog

The detail of a resource is divided into various sections:

- Details
- Properties
- Tags & Notes
- Cost

In the Cost section, it is possible to sequentially select the Region, Zone, and Cost type to obtain a preview of the costs related to the selected resource.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with various cloud provider icons (CMP, AmazonWebServices, Azure, AzureStack, etc.) and user information (cmp_admin, DEFAULT, English). Below the navigation, a breadcrumb path indicates the current view: Catalog / Amazon Web Services (AWS) / View 643e7be8dc4fe35ba69b11d7. The main content area is titled "Show VM del Catalogo AWS". It contains several sections: "Details" (listing System: AmazonWebServices, Name: a1-2xlarge, Size: a1-2xlarge, Update Date: 23/06/2023), "Properties", "Tags & Notes" (highlighted with a red box), and "Costs". In the "Costs" section, there are dropdown menus for "Region" (set to US East (N. Virginia)), "Zone" (set to Us-east-1b), and "Price" (set to Reservation - Linux \$0.13 / 1 Hour). A "Close" button is located at the bottom right of this section.

Figura 265 – Sezione costi della risorsa

In the bottom right, click the "Close" button to return to the list.

9.0.3 “Services and Blueprints” Item Management

9.0.3.1 Services

To access the "Services" functionality, click on the bento button in the upper left corner and then click on "Catalog".

CMP



 Authentication

 Monitoring

 Costs

 Inventory

① Security

Dashboard

Catalog

☒ Administration

🛡 Cloud Maturity Model

🔧 Provisioning

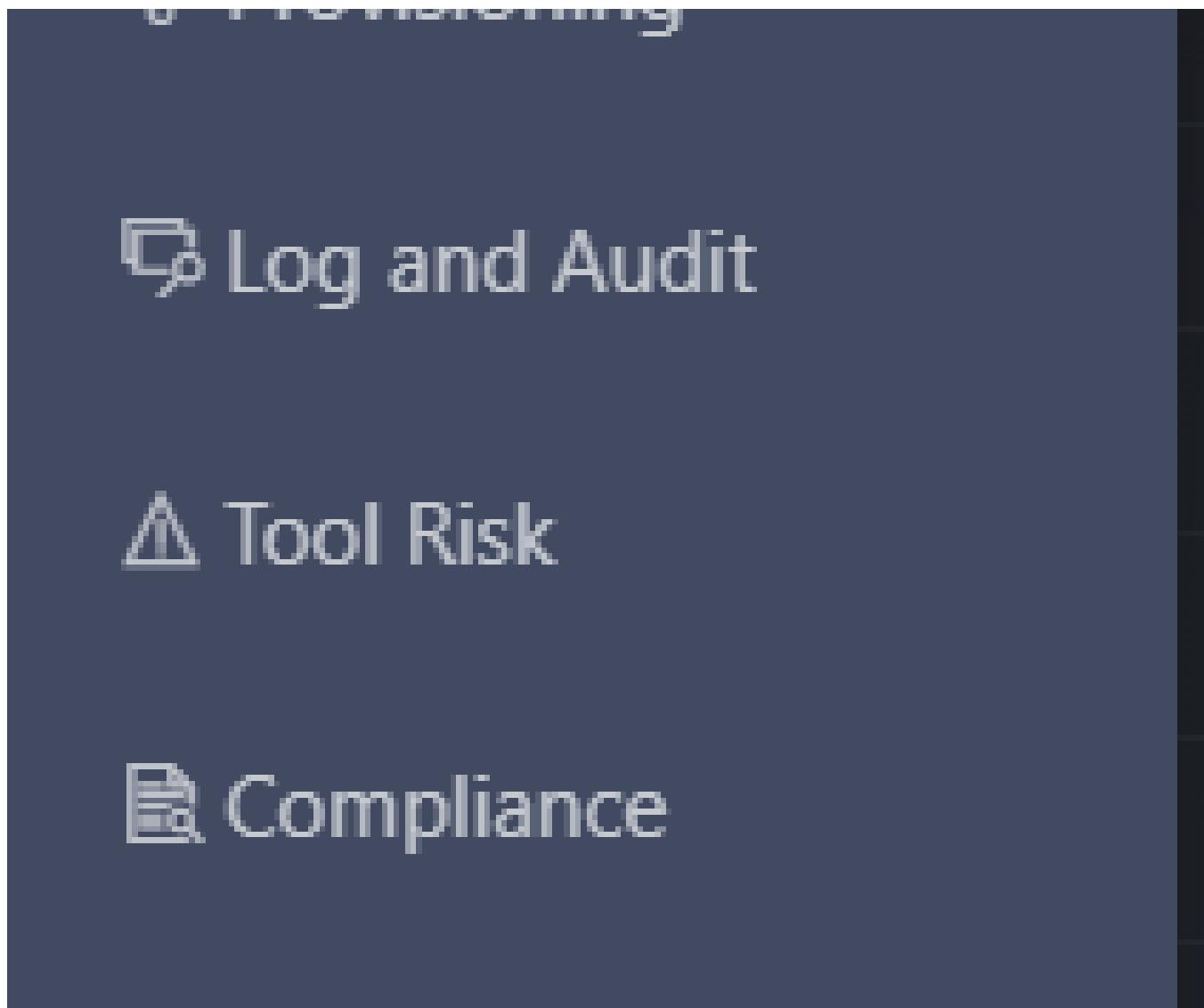


Figura 266 – Accesso ai "Services"

From the "SCMP" page, click on the tab that depicts three joined squares, 'Services', located above the breadcrumb path. After doing this, you will be on the 'Services' page, where a list of components called "Card" is displayed.

Each card refers to a specific type of service. Since there are many services, the system paginates them. At the bottom, we can use the "Item per page" field to display more results or use the arrows to navigate through the lists of services.



The screenshot shows the Leonardo Secure Cloud Management Platform's Services catalog. On the left, there is a sidebar with three filter sections: 'Filter by text' (with a 'Filter' input field), 'Categories' (with a 'Filtr' input field), and 'Tags' (with a 'Filtr' input field). The main area displays a grid of service cards. Each card features the AWS logo and a title. The titles are: 'AWS Controllers for Kubernetes - Amazon ACM', 'AWS Controllers for Kubernetes - Amazon ACM PCA', 'AWS Controllers for Kubernetes - Amazon API...', 'AWS Controllers for Kubernetes - Amazon Application...', 'AWS Controllers for Kubernetes - Amazon CloudFront', and 'AWS Controllers for Kubernetes - Amazon CloudTrail'. Below the grid, there is a pagination control with 'Items per page: 10' and a page indicator '1 - 10 of 354'.

Figura 267 – Pagina dei servizi

9.0.3.1.1 "SERVICES" PAGE FILTERS

To facilitate the user in searching for a specific service, a side filter section has been added to the page. Inside, we can find three combinable filters:

- "Filter by Text": by entering text in this field, the list of services will be updated to show services that include the entered text in their title or description (orange in the image).
- "Categories": it is possible to filter the list by one or more service categories. The category is manually entered during the service creation phase (green in the image).
- "Tags": it is possible to select one or more tags to display only services that have been configured with that tag (red in the image).

By using the filters in combination, it will be possible to display only the services that satisfy all specified conditions. In other words, the query will return only the services that match all set criteria.

Figura 268 – Filtri disponibili

9.0.3.1.2 CREATING SERVICES

From the "Services" page, the user can create a Service by accessing the appropriate section as shown in the figure.

Figura 269 – Accesso al form di creazione del Service



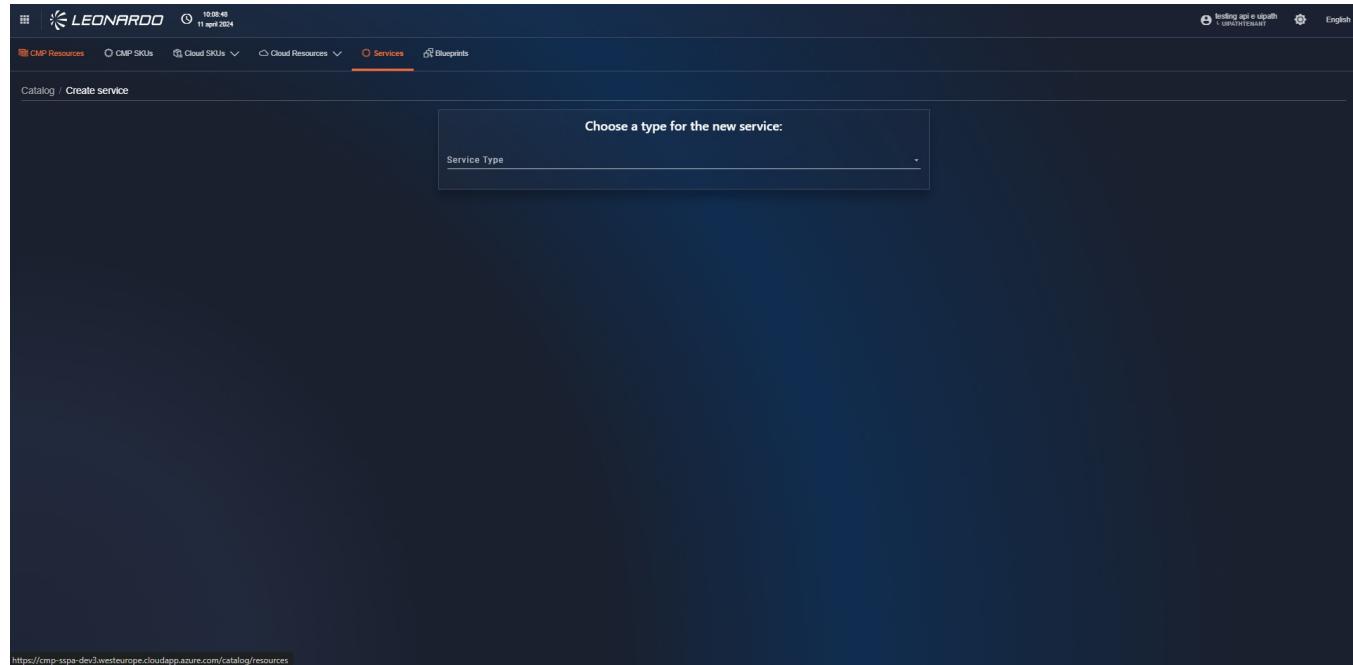
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On the creation page, it is necessary to select a service type using the "Service Type" field to display its mandatory parameters.



*Figura 270 – Selezione della tipologia
di servizio*

In the following paragraphs, we will analyze the individual service types in detail.

9.0.3.1.2.1 "Standard" Services

The first type of services available for the SCMP are "Standard" services. These services are natively integrated into the system, and their operation cannot be modified by the user.

List of services offered:

- CosmosDb Cassandra SQL
- CosmosDb Core SQL
- CosmosDb Mongo
- Kafka 3.2.1 on Ubuntu 20.04 LTS
- Kafka 3.2.1 on Ubuntu 22.04 LTS
- Mongo DB 5.0 on Ubuntu 20.04 LTS
- Mongo DB 6.0 on Ubuntu 20.04 LTS

- Mongo DB 6.0 on Ubuntu 22.04 LTS
- MySQL DB 8.0 on Ubuntu 20.04 LTS
- MySQL DB 8.0 on Ubuntu 22.04 LTS
- PostgreSQL 14 on Ubuntu 20.04 LTS
- PostgreSQL 14 on Ubuntu 22.04 LTS
- Redis DB 7.0 on Ubuntu 20.04 LTS
- Redis DB 7.0 on Ubuntu 22.04 LTS

To insert a new service, it is necessary to fill in all fields in the properties section, specifically:

- "Categories": enter free text in the field and select an already configured category from the dropdown, or it is possible to add a new category by clicking the "+" button in the dropdown (orange in the page).
- "Name": the name of the service that will be displayed on the corresponding card.
- "Description": the description of the service that will be shown on the relative card.
- "Upload File": by clicking this control, it will be possible to select an "image" type file from your PC that will be displayed on the service card.
- "Related Software": in this section, you can select one or more "Standard" software that will then be used during provisioning.

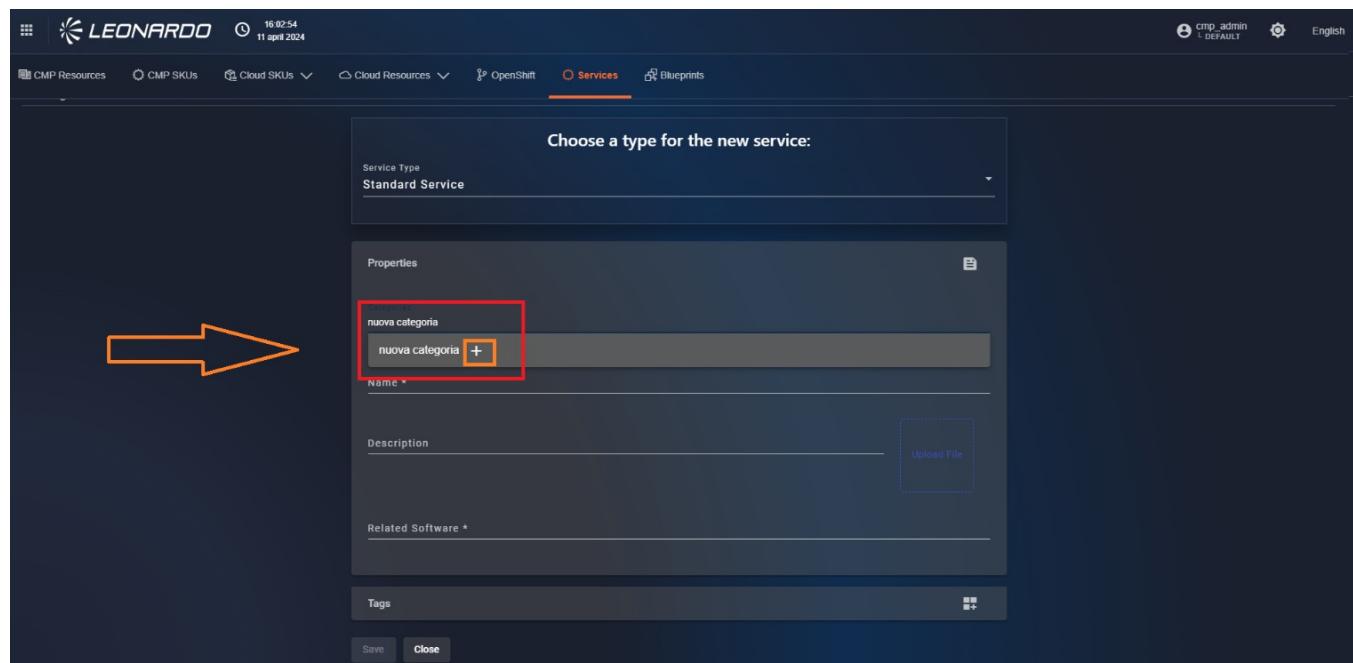


Figura 271 – Aggiunta nuova categoria



Once all data has been entered, the service can be saved using the "save" button in the bottom right. A confirmation modal will be displayed, and the user will be redirected to the list of available services.

9.0.3.1.2.2 "Custom" Services

The user is given the possibility to define "Custom" services by uploading a zip file containing all the necessary files for execution.

In this specific case, the SCMP system is only used to save the service and launch its execution, so it is not possible to check the correctness of the process, which will have to be managed by the user.

all are orchestrators, but with different functionalities and purposes:

1. Ansible:

- **Server and application orchestration:** Ansible automates the configuration and management of servers and applications across different platforms.
- **Executes YAML playbooks:** Ansible uses YAML playbooks to define instructions to be executed on servers.
- **Does not require an agent:** Ansible is agentless; it does not require software installation on the servers to be managed.

2. Bicep:

- **DSL language for Azure:** Bicep is an Azure-specific DSL that facilitates defining infrastructure as code.
- **Creates ARM templates:** Bicep translates files into ARM (Azure Resource Manager) templates that Azure uses to create resources.
- **Integrates with Azure DevOps:** Bicep integrates with Azure DevOps for lifecycle management.

3. Kubernetes:

- **Container orchestration:** Kubernetes is the leading platform for large-scale container orchestration.
- **Automates deployment and management:** Kubernetes automates the deployment, scaling, and management of containers in clusters.
- **Offers an ecosystem of tools:** Kubernetes offers a rich ecosystem of tools and libraries for container management.

4. Terraform:

- **Infrastructure as Code:** Terraform is an open-source tool for managing infrastructure as code.
- **Defines infrastructure in HCL files:** Terraform uses HCL configuration files to define the desired infrastructure.
- **Supports different providers:** Terraform supports a wide range of cloud and on-premise providers.

In summary:

- **Ansible:** Ideal for automating server and application configuration.
- **Bicep:** Great for defining infrastructure on Azure in a readable way.
- **Kubernetes:** Powerful tool for large-scale container orchestration.
- **Terraform:** Flexible for managing infrastructure across multiple cloud providers or on-premise.

In the configuration of "Custom" services, we can identify a common section composed of the initial parameters:

- "Categories": enter free text in the field and select an already configured category from the dropdown, or it is possible to add a new category by clicking the "+" button in the dropdown.
- "Name": the name of the service that will be displayed on the corresponding card.
- "Description": the description of the service that will be shown on the relative card.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with the Leonardo logo, user information (cmp.admin, L DEFAULT), and language selection (English). Below the navigation, a breadcrumb trail shows 'Catalog / Create service'. The main area has a title 'Choose a type for the new service:' with a 'Custom Service' option selected. A large red box highlights the 'Properties' section, which contains fields for 'Categories', 'Name *' (with a red arrow pointing to it), 'Description', 'Script Type *' (a dropdown menu), and an 'Upload File' button. At the bottom of the properties section is a 'Tags' section with a plus sign icon.

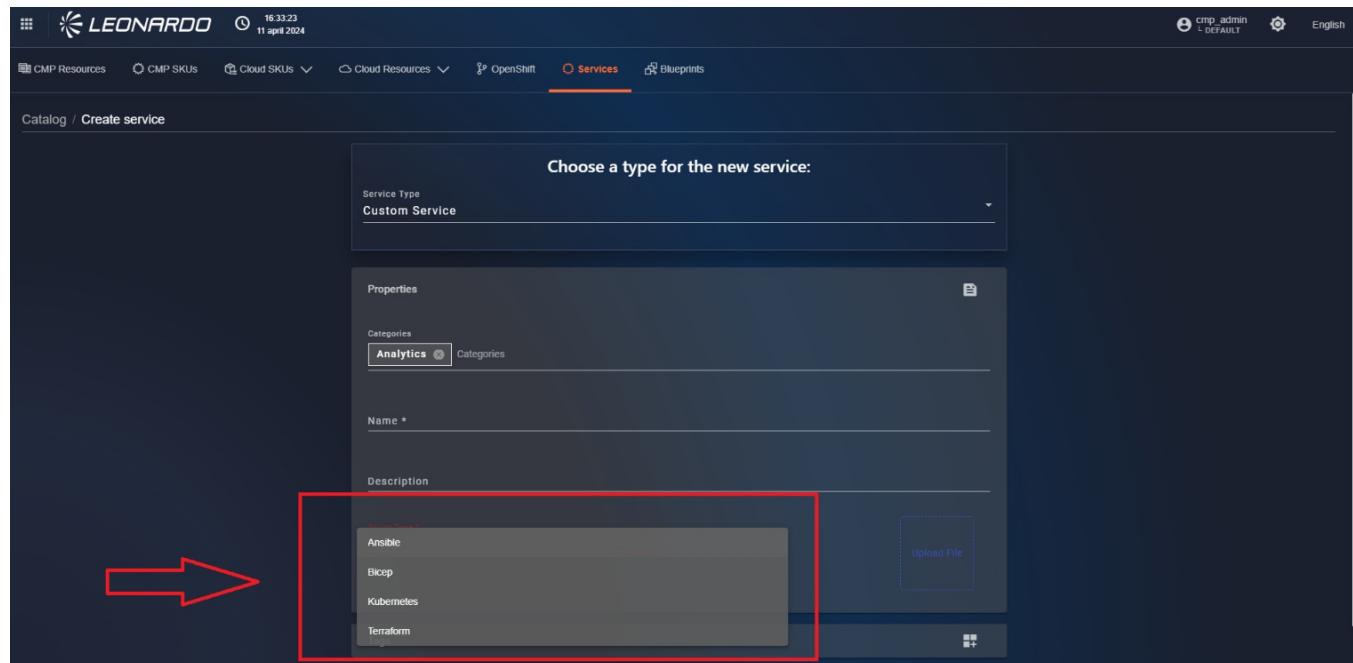
Figura 272 – Parametri generali dei
"Custom Services"

Subsequently, it is necessary to choose the type of "orchestrator" to use and insert the corresponding ".zip" file in the "Upload File" section. The specifications for each type are indicated below:

Script type	Mandatory .zip file content
Ansible	Instance.yaml - Vars.yaml

Script type	Mandatory .zip file content
Bicep	Main.bicep - Main.parameters.json
Kubernetes	Only .YAML files
Terraform	Main.tf - Variable.tf - Provider.tf

In addition to the files described in the table, it is possible to add a ".png / .jpg / .img" file to the zip that will then be used as the image for the corresponding Card.



*Figura 273 – Selezione della tipologia
di Orchestratore*

Once all data has been entered, the service can be saved using the "save" button in the bottom right. A confirmation modal will be displayed, and the user will be redirected to the list of available services.

9.0.3.1.2.3 "Azure Pipeline" Services

The user is given the possibility to define "Azure Pipeline" services. This type of service allows the SCMP to invoke the execution of a remote DEVOPS pipeline usable through the provisioning functionality.

In the configuration of "Azure Pipeline" services, we can identify a general section composed of the parameters:

- "Categories": enter free text in the field and select an already configured category from the dropdown, or it is

possible to add a new category by clicking the "+" button in the dropdown. "Name": the name of the service that will be displayed on the corresponding card.

- "Description": the description of the service that will be shown on the relative card.

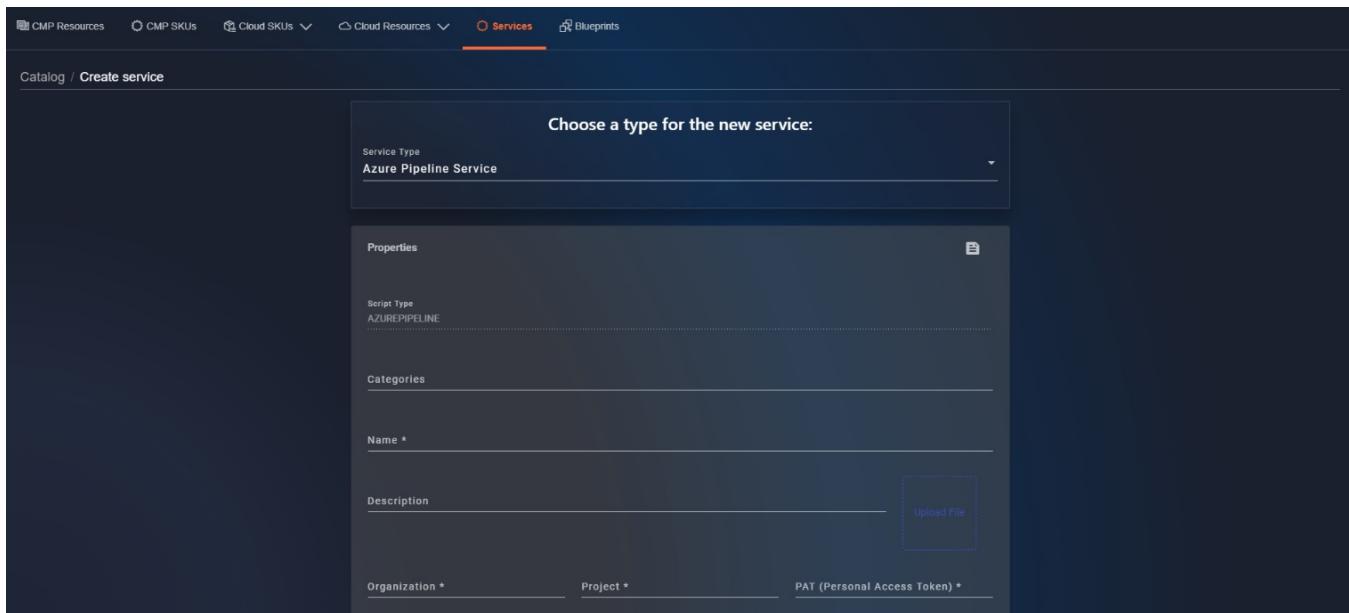


Figura 274 – Parametri generali "Azure pipeline service"

Also for this service, it will be possible, through the "Upload File" field, to insert a ".zip" file that contains a ".png / .jpg / .img" file within the zip, which will then be used as the image for the corresponding Card.

Subsequently, it will be necessary to fill in the specific parameters of the service, in particular, it will be necessary to insert:

- "Organization": the name of the DevOps organization where the pipeline resides.
- "Project": the name of the DevOps project where the pipeline resides.
- "PAT": the private personal access token generated from the "Azure DevOps" portal. Once these fields are filled, it is possible to click the "Test" button to verify the entered parameters.

If the entered data is not valid, various error messages will be displayed indicating which parameter is incorrect (e.g., "Specified Organization is not valid.") and the button will turn red with "KO" written. When all parameters are correct, the button will turn green with "OK" written.



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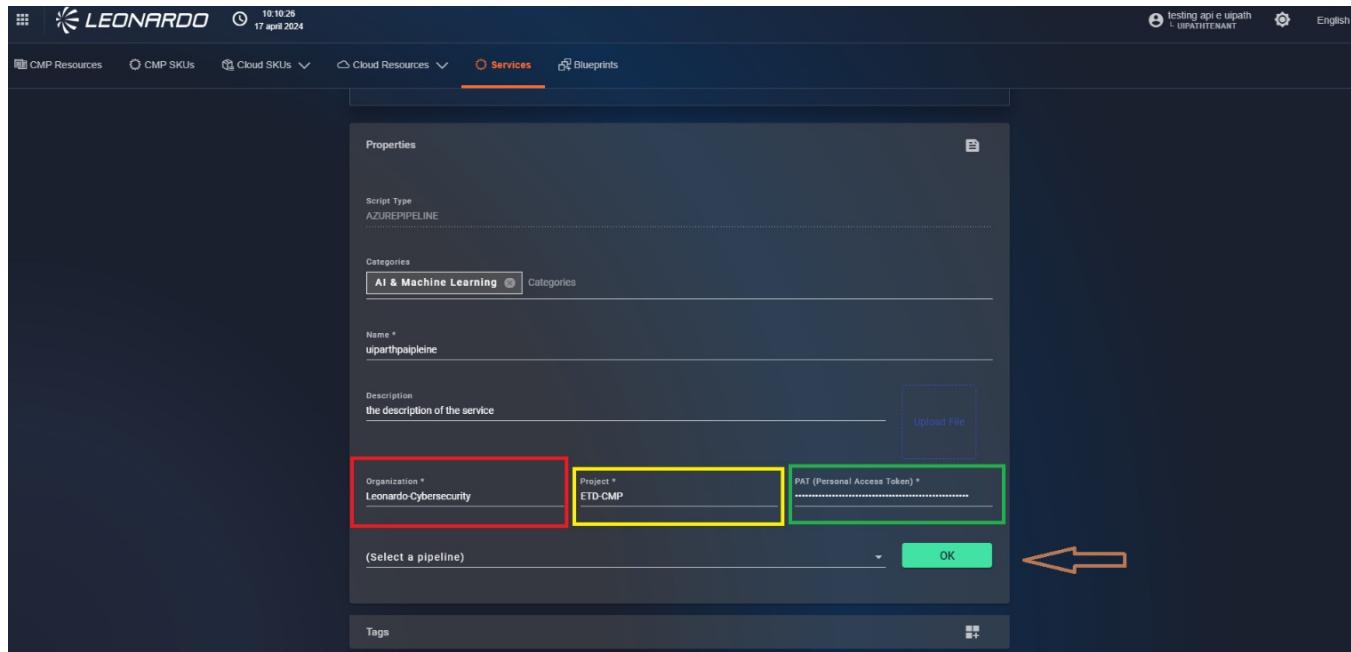


Figura 275 – Parametri specifici delle Pipeline

After successfully performing the test, it will be possible to select the pipeline to execute using the "Select Pipeline" field and clicking on an available option.

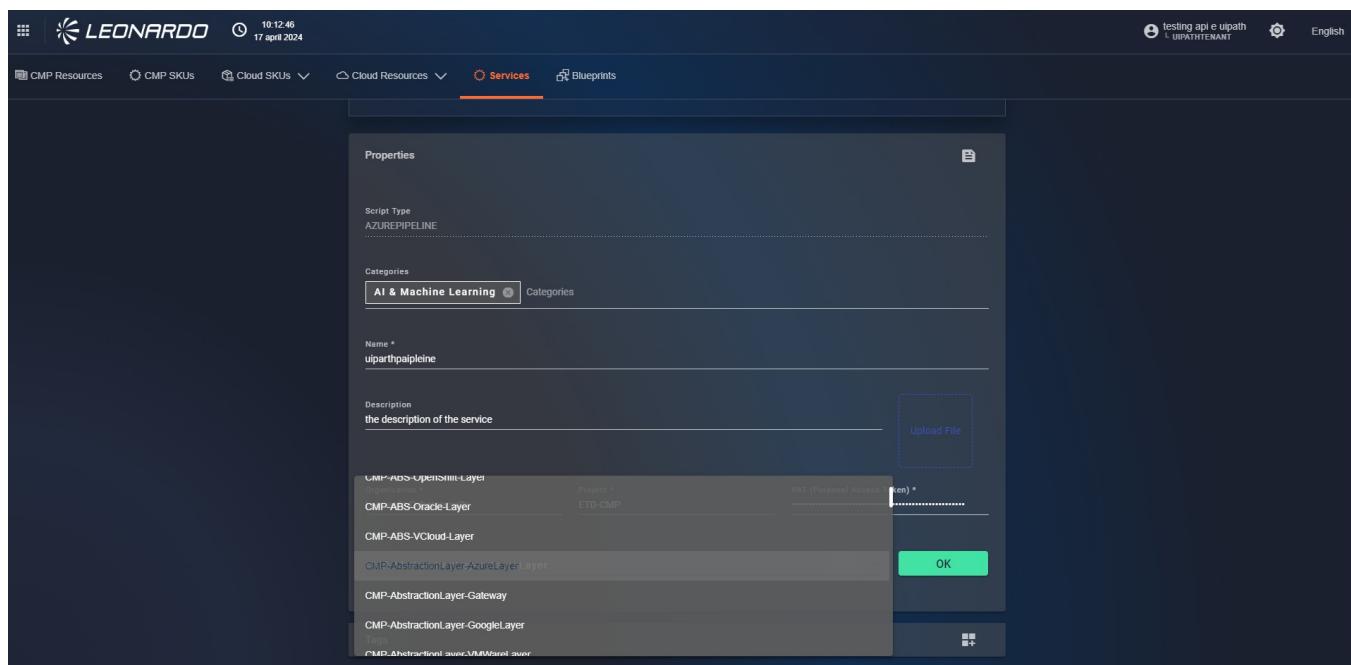




Figura 276 – Selezione della pipeline

Once all data has been entered, the service can be saved using the "save" button in the bottom right. A confirmation modal will be displayed, and the user will be redirected to the list of available services.

9.0.3.1.2.4 "HELM" Services

We can also configure "HELM" type services within the SCMP. For the configuration of these services, it is necessary to enter these parameters:

- "Categories": enter free text in the field and select an already configured category from the dropdown, or it is possible to add a new category by clicking the "+" button in the dropdown.
- "Chart name": the actual name of the HELM CHART that will be used.
- "Chart repository": the URL relative to the repository containing the HELM CHART to be used.
- "Repository username": if the repository indicated above is private, it will be necessary to provide a username to access the repository.
- "Repository password": if the repository indicated above is private, it will be necessary to provide the password for the user indicated above.
- "Chart version": indicates which version of the chart to use.
- "Cluster": indicates which cluster to install the application on.
- "Description": the description of the service that will be shown on the corresponding card.
- "Image": in this section, it is possible to insert a .png file that will be used as the service image on the interface.
- "Immutable": Selecting this flag during provisioning will prevent modification of settings, and the service will be automatically configured based on.
- "Namespace": enter the name for the namespace where the deployment should occur.
- "Name": the name of the service that will be displayed on the corresponding card.
- "Configurations": in this section, it is possible to upload the values.yaml file that will be used for provisioning.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there are navigation tabs: SCMP Resources, SCMP SKUs, Cloud Resources, Cloud SKUs, Services (which is highlighted in orange), Blueprints, and Reports. On the right side, there are user account and language settings. Below the tabs, the page title is "Catalog / Create service". A prominent callout box says "Choose a type for the new service:" with "Helm Service" selected under "Service Type". The main form area has sections for "Properties" (Chart Name, Chart Repository, Repository Password, Repository Username, Chart Version), "Categories", and "Description".

Figura 277 – Parametri generali dei
"HELM Services"

For these services, it is also possible to prevent any kind of service modification by selecting the "immutable" option and entering a namespace and a cluster in which to deploy the applications.

The screenshot shows the "Cluster" configuration interface for the Helm Service. It includes fields for "Cluster", "Description", "Image" (with an "Upload File" button), "Immutable" (checkbox checked), "Namespace", "Name" (with "Script Type: HELM" noted), and "Configuration (values.yaml)" (with an "Upload File" button).

Figura 278 – Parametro "immutable"

Once all data has been entered, the service can be saved using the "save" button in the bottom right. A confirmation modal will be displayed, and the user will be redirected to the list of available services.

9.0.3.1.3 EDITING AND DELETING SERVICES

In addition to creating a Service, it is possible to view, modify, and delete it.

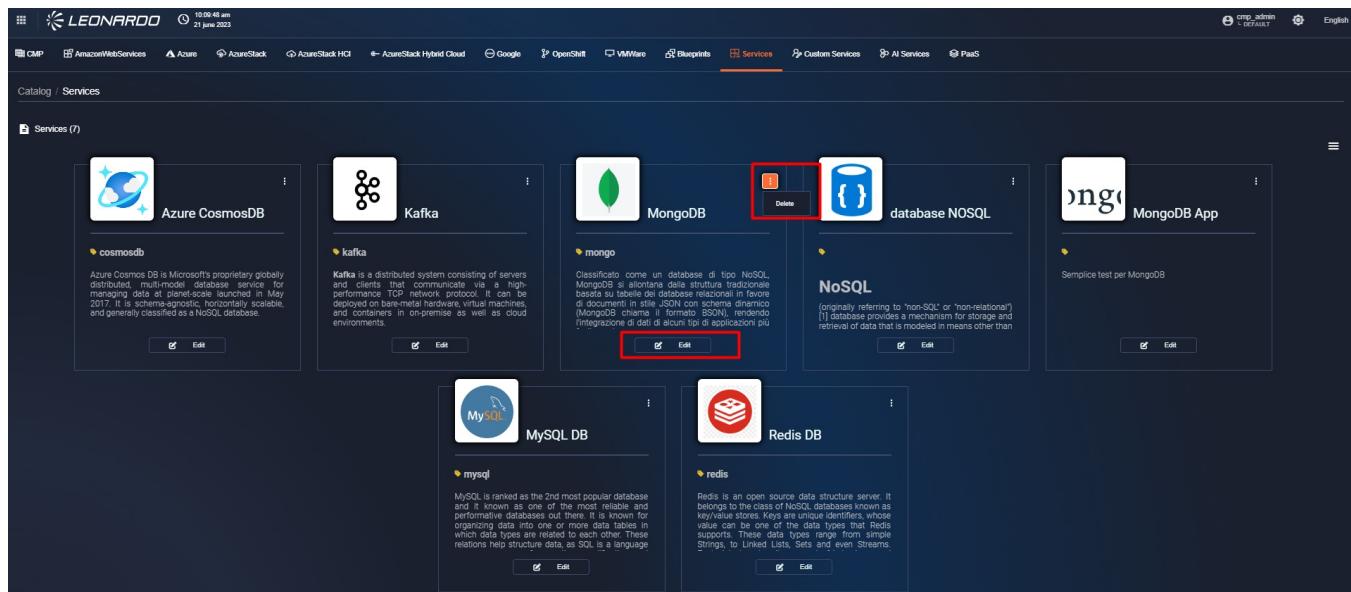


Figura 279 – Operazioni disponibili per i Services

- To modify the information of a "Service", click the "Edit" button within the card. Afterward, within the form, the user can modify the necessary data. After performing the edit operations, in the bottom right, click the "Submit" button. After doing this, the user is on the "Service" page.



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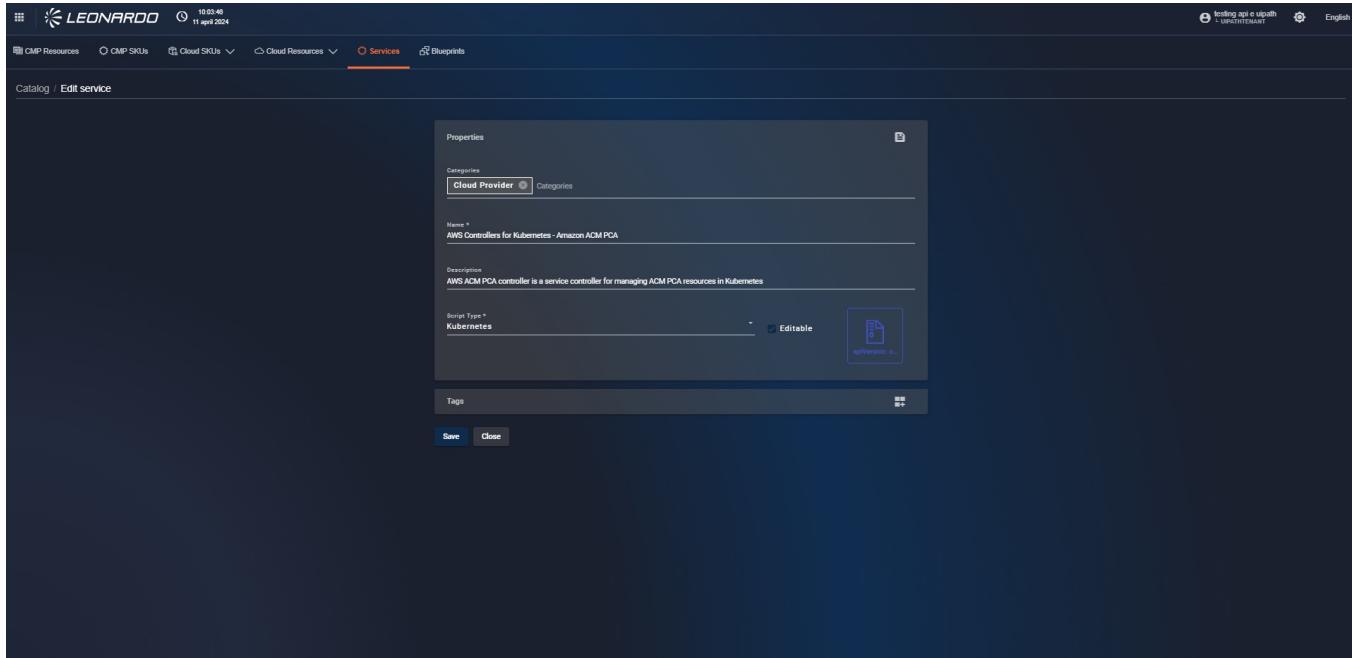


Figura 280 – Pagina di edit per un servizio

- To delete a "Service", click on the kebab menu of said service and then click on "Delete". After doing this, a confirmation modal for service deletion appears. At this point, it is necessary to click the "Remove" button.

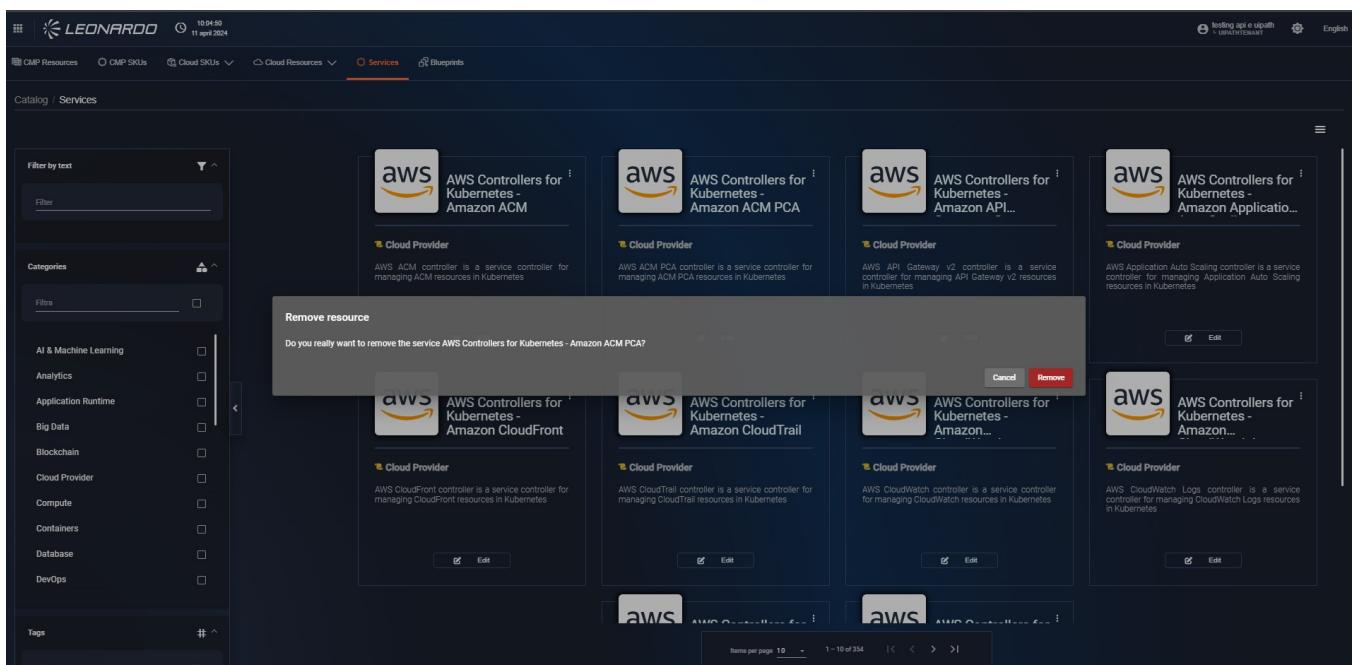
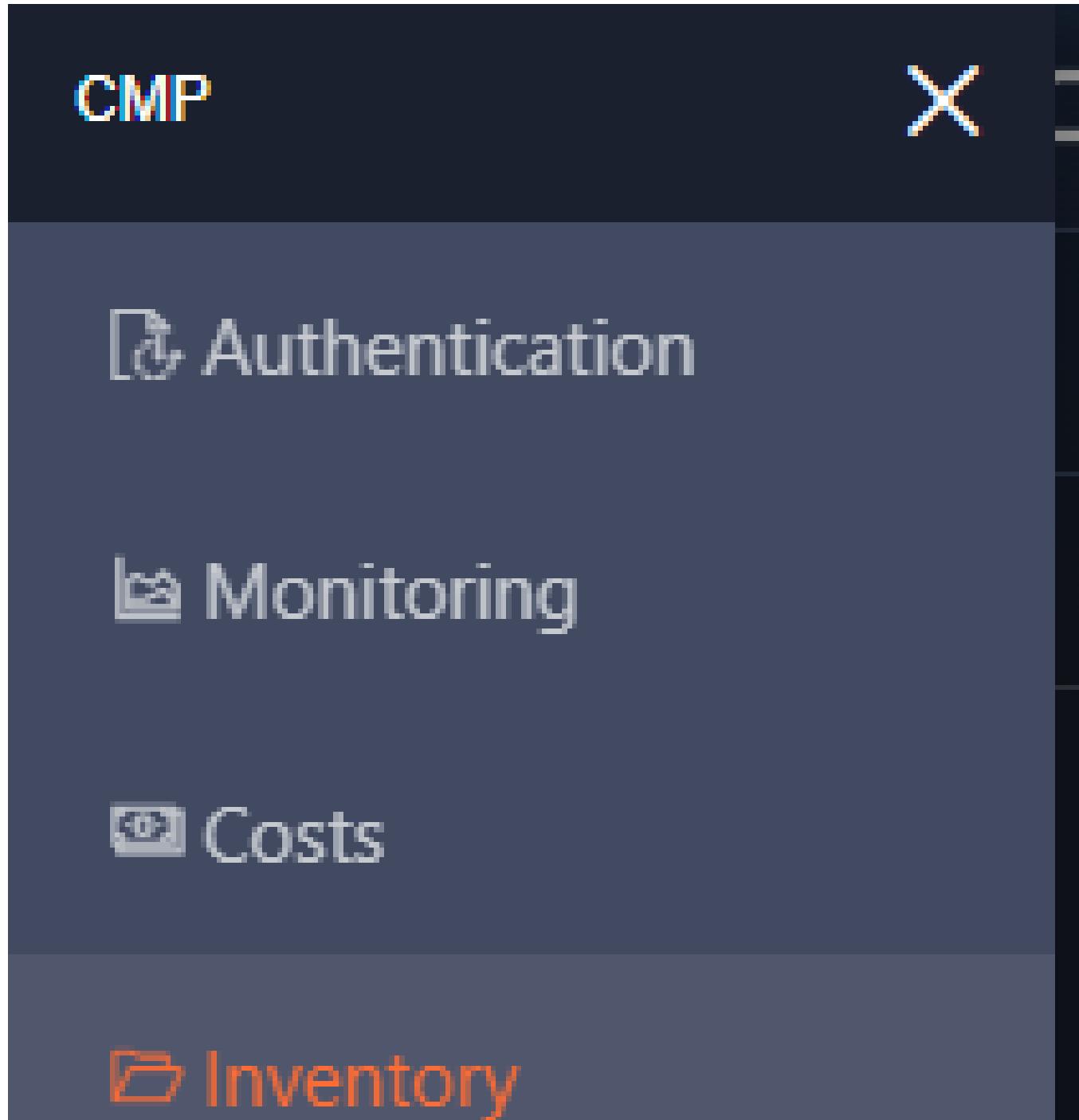


Figura 281 – Eliminazione di un servizio

9.0.3.2 Blueprint Management

To access the "Services" functionality, click on the bento button in the upper left corner and then click on "Catalog".



⊕ Security

GridLayout Dashboard

Catalog

Administrator

Cloud Maturity Model

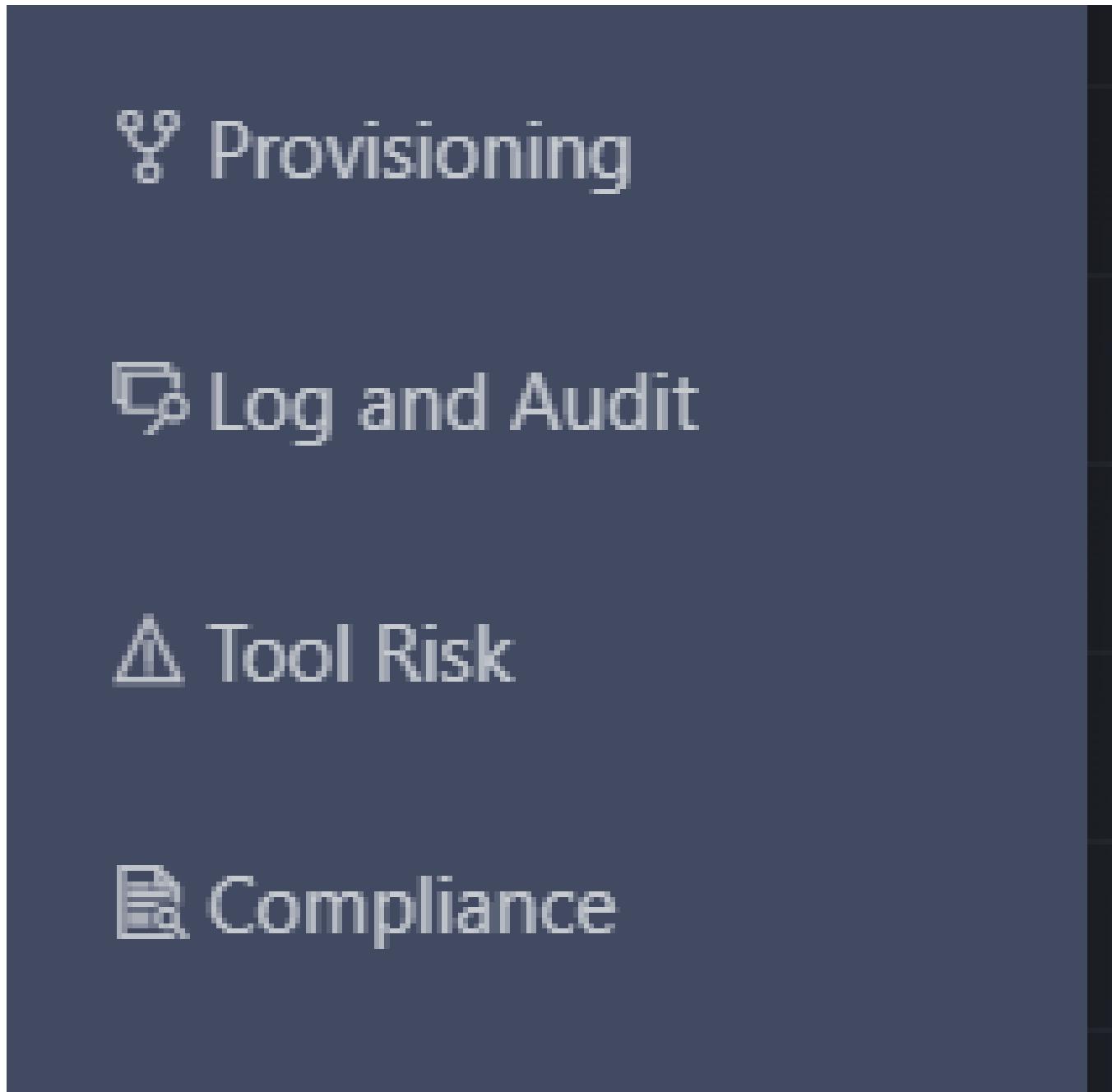


Figura 282 – Accesso alle "Blueprint"

From the "SCMP" page, click on the tab that depicts three joined squares, 'Blueprint', located above the breadcrumb path. After doing this, you will be on the 'Blueprint' page, where the list of blueprints configured in the system is displayed.



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Name	Description	Creation Date	Status
AKS Cluster & Helm Release	AKS Cluster & Helm Release	08/02/2024 09:11:51	✓
Blueprint with manual intervention	-	16/02/2024 14:11:14	✓
Docker development environment	Ubuntu VM setup for container development	22/02/2024 09:53:31	✓
Only manual	Blueprint with human tasks only	13/03/2024 09:39:32	✓
Onboarding Pubblica Amministrazione Secure Public Cloud GCP	Procedura di Onboarding nuova PA su Secure Public Cloud Google	14/03/2024 12:13:38	✓
Declarative blueprint	Blueprint with topology definition, but no provisioning plan	28/03/2024 14:13:35	✓

Figura 283 – Pagina delle Blueprint

9.0.3.2.1 ADDING A NEW BLUEPRINT

From the "Blueprint" page, the user can create a new blueprint by accessing the appropriate section as shown in the figure, by clicking the "hamburger menu" in the upper right corner and selecting "Add Blueprint".

Name	Description	Creation Date	
manual	only manual	10/04/2024 08:09:07	✓
name	dsescr	10/04/2024 09:45:36	Draft
myBlueprintName	description	10/04/2024 09:46:13	✗
isAnewName	descrizione32	10/04/2024 09:46:51	✓



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Figura 284 – Aggiunta nuova Blueprint

The user is redirected to step 1 of the "Blueprint" creation where all general information about the blueprint can be entered. After entering the data, click the "Save blueprint" button to save the blueprint draft. For details on the status, please refer to the next paragraph.

The screenshot shows a dark-themed web application interface. At the top, there's a navigation bar with links for 'CMP Resources', 'Cloud SKUs', 'Cloud Resources', 'Services', and 'Blueprints'. The 'Blueprints' link is highlighted with a red underline. Below the navigation, a breadcrumb trail reads 'Catalog / Blueprints / Add Blueprint'. The main content area is titled '1 Definition' and contains several input fields: 'Description', 'Name *' (marked with a red asterisk), 'Notes', 'Tier', and 'Version'. At the bottom right of this form is a grey button labeled 'SAVE BLUEPRINT'.

Figura 285 – Blueprint step 1

A confirmation modal for insertion will open. Once "yes" is clicked to continue, the user will see step 2 of blueprint creation.

Clicking "No" will cancel the draft insertion.



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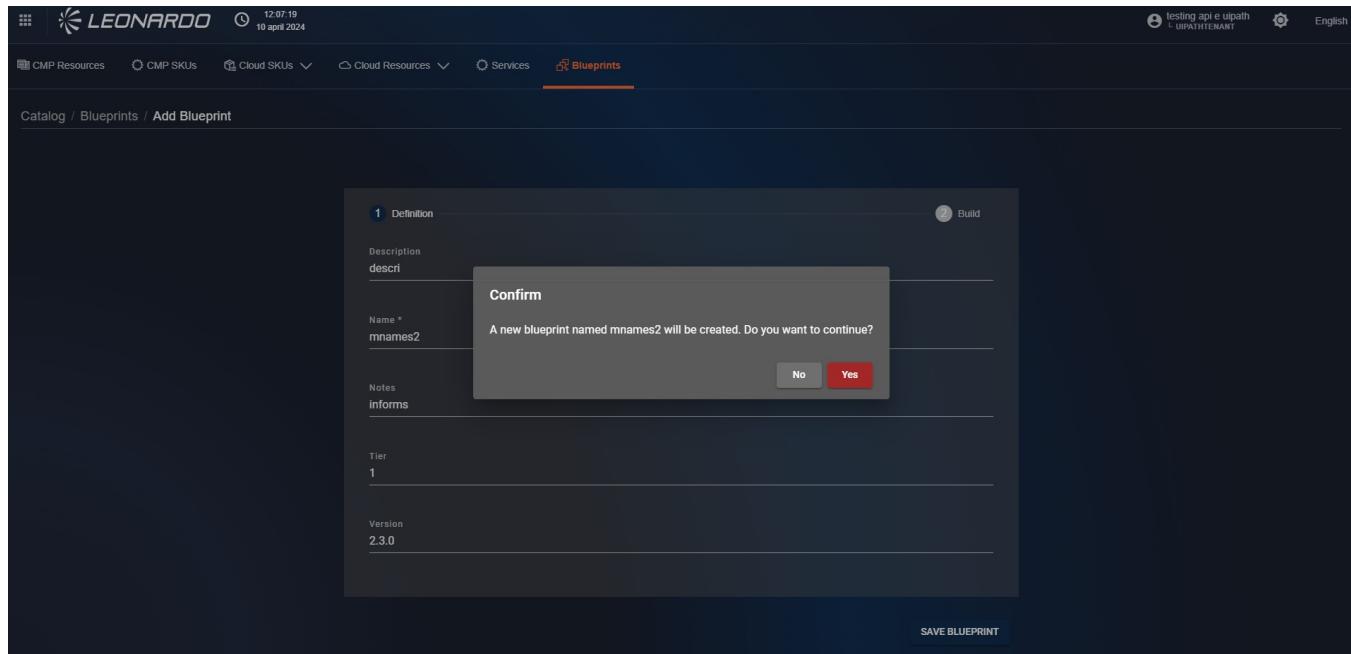


Figura 286 – Blueprint conferma della bozza

In step 2 of creating a Blueprint, it is necessary to click within the "Upload File" field and, using the Windows upload window, select the ".CSAR" file that contains the Blueprint.

After selecting a file, click the "Upload" button in the bottom right to start the file validation process, following the list of statuses in the paragraph below.

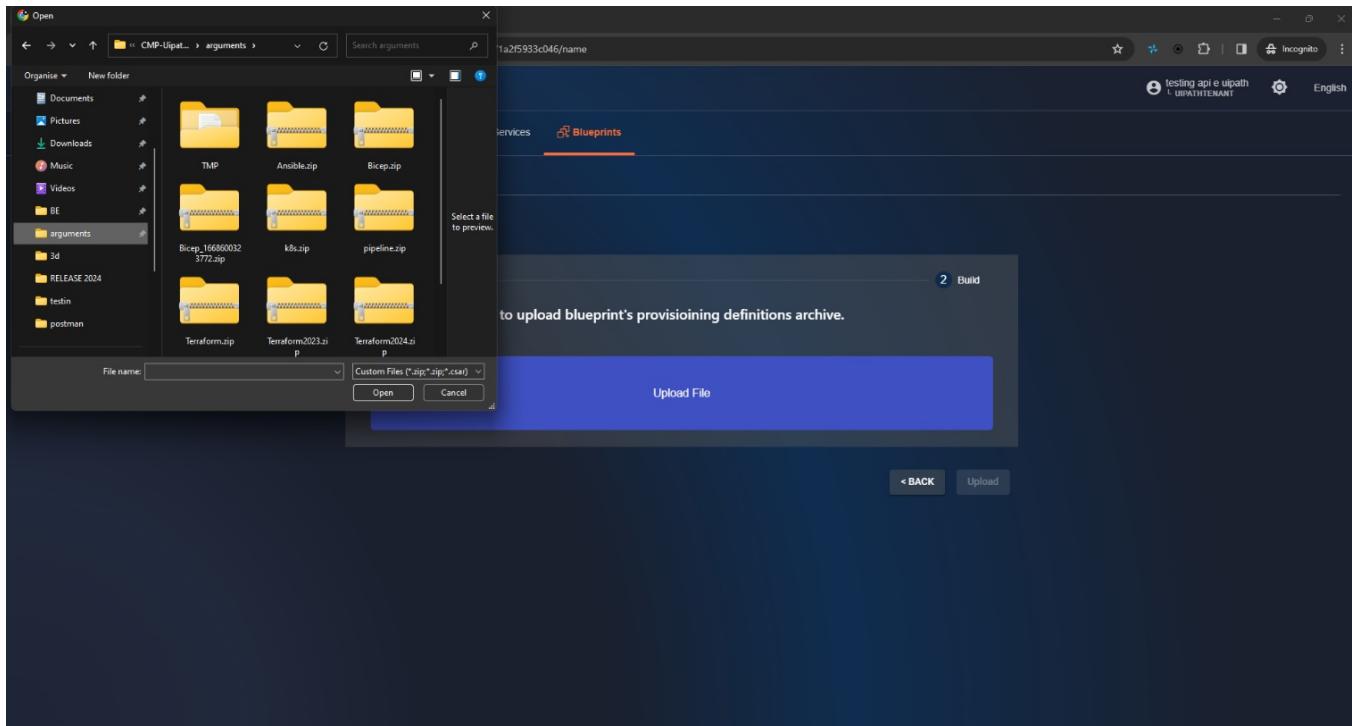


Figura 287 – Inserimento file

9.0.3.2.2 BLUEPRINT STATUS

Since "Blueprints" are complex objects that must be properly configured, a file validation system has been implemented to allow the use of only "Blueprint" services that are correctly configured.

Specifically, there are 4 possible "STATUSES":

1. READY TO USE (green checkmark): indicates that the blueprint is configured correctly and can be used during "Provisioning".
2. VERIFY (yellow circle): indicates that the SCMP is validating the content of the Blueprint.
3. FAILED (red "X"): indicates that the uploaded file is not valid and must be re-entered by the user after correction.
4. DRAFT (orange): indicates that the "blueprint" has been created as a draft but does not contain the necessary CSAR file. Once the file is inserted, the blueprint will change to VERIFY status.



Name	Description	Creation Date	Status
manual	only manual	10/04/2024 08:09:07	
name	dscr	10/04/2024 09:45:36	
myBlueprintName	description	10/04/2024 09:46:13	
isAnewName	descrizione32	10/04/2024 09:46:51	

Blueprint's archive upload success! OK

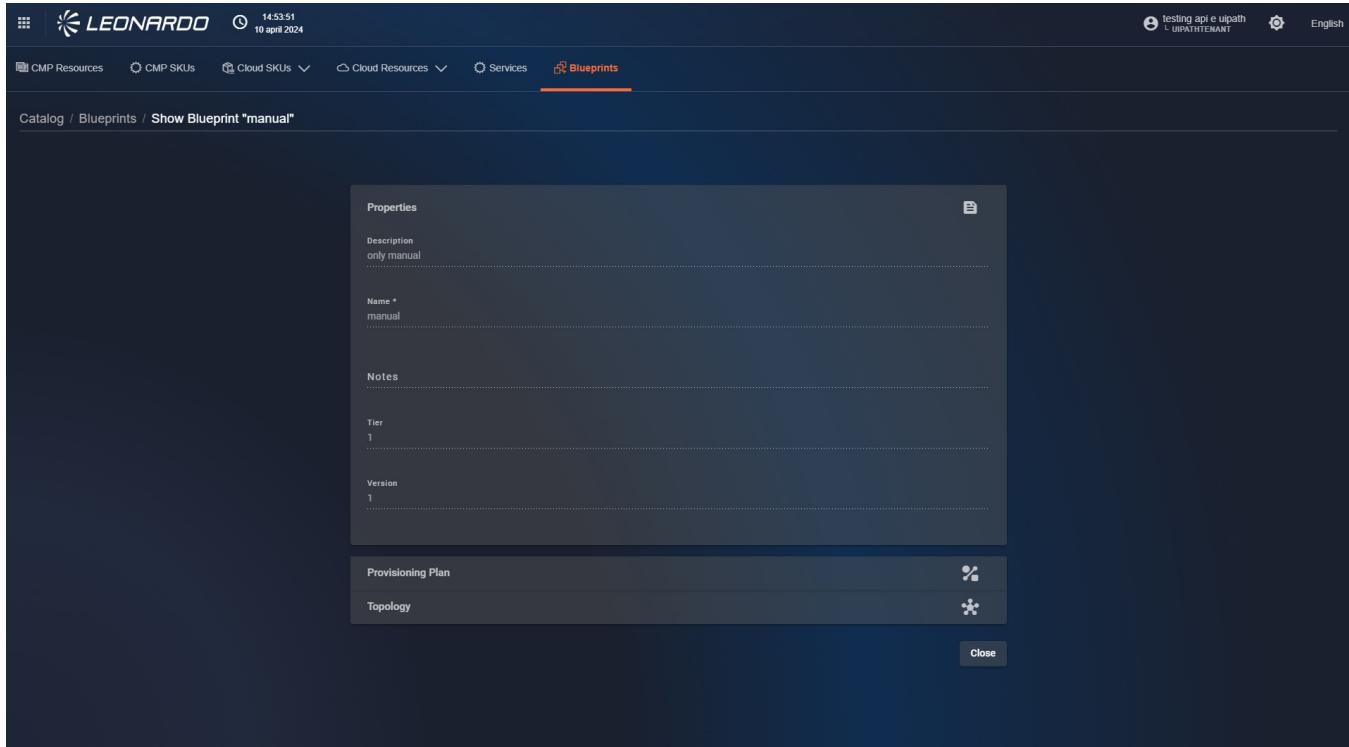
Figura 288 – Status delle Blueprint

9.0.3.2.3 VIEWING, EDITING, AND DELETING BLUEPRINTS

In the table of available blueprints, for each row, on the right, there is a contextual menu. Once opened, it contains three functionalities:

The "View" functionality: allows viewing the details of the blueprint. Once clicked, the user will be redirected to the blueprint viewing page.

- Properties: in this section, it is possible to modify the basic information of the blueprint (Figure 241).
- Provisioning plan: in this section, there is the bpmn graph which provides a graphical representation of the "steps" foreseen by the "Blueprint" (Figure 242). This section contains three buttons to modify the plan: the first, shaped like a "folder", allows uploading a new BPMN file to the edit page; the second, "download", allows downloading the currently displayed bpmn file; the third, on the right, "Upload", overwrites the current bpmn file available for the blueprint.
- Topology: The topology of a blueprint is the arrangement of components in a Kubernetes cluster. In this section, we can graphically visualize the system structure among different pods, services, and components (Figure 243).
- Update Model: in this section, it is possible to upload the CSAR file. By making this modification, the Blueprint will return to the "VERIFY" state to validate its content (Figure 244).



*Figura 289 – Sezioni della pagina
Blueprint "view"*

The "Edit" functionality allows viewing and modifying all blueprint parameters, including the related CSAR file. It contains the following sections:

- Properties: in this section, it is possible to modify the basic information of the blueprint.
- Provisioning plan: in this section, there is the bpmn graph which provides a graphical representation of the "steps" foreseen by the "Blueprint". This section contains three buttons to modify the plan: the first, shaped like a "folder", allows uploading a new BPMN file to the edit page; the second, "download", allows downloading the currently displayed bpmn file; the third, on the right, "Upload", overwrites the current bpmn file available for the blueprint.
- Topology: The topology of a blueprint is the arrangement of components in a Kubernetes cluster. In this section, we can graphically visualize the system structure among different pods, services, and components.
- Update Model: in this section, it is possible to upload the CSAR file. By making this modification, the Blueprint will return to the "VERIFY" state to validate its content.



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The screenshot shows a dark-themed web application interface. At the top, there is a navigation bar with links for 'CMP Resources', 'CMP SKUs', 'Cloud SKUs', 'Cloud Resources', 'Services', and 'Blueprints'. The 'Blueprints' link is underlined, indicating it is the active section. Below the navigation, the URL 'Catalog / Blueprints / Edit Blueprint "isAnewName"' is visible. The main content area is titled 'Properties' and contains several input fields:

- Description: `descrizione`
- Name: `myblueprint`
- Notes: `noted`
- Tier: `1`
- Version: `2`

Below the properties section, there are two tabs: 'Topology' and 'Provisioning Plan'. Each tab has a small icon next to its name.

Figura 290 – Sezioni della pagina
Blueprint "edit"

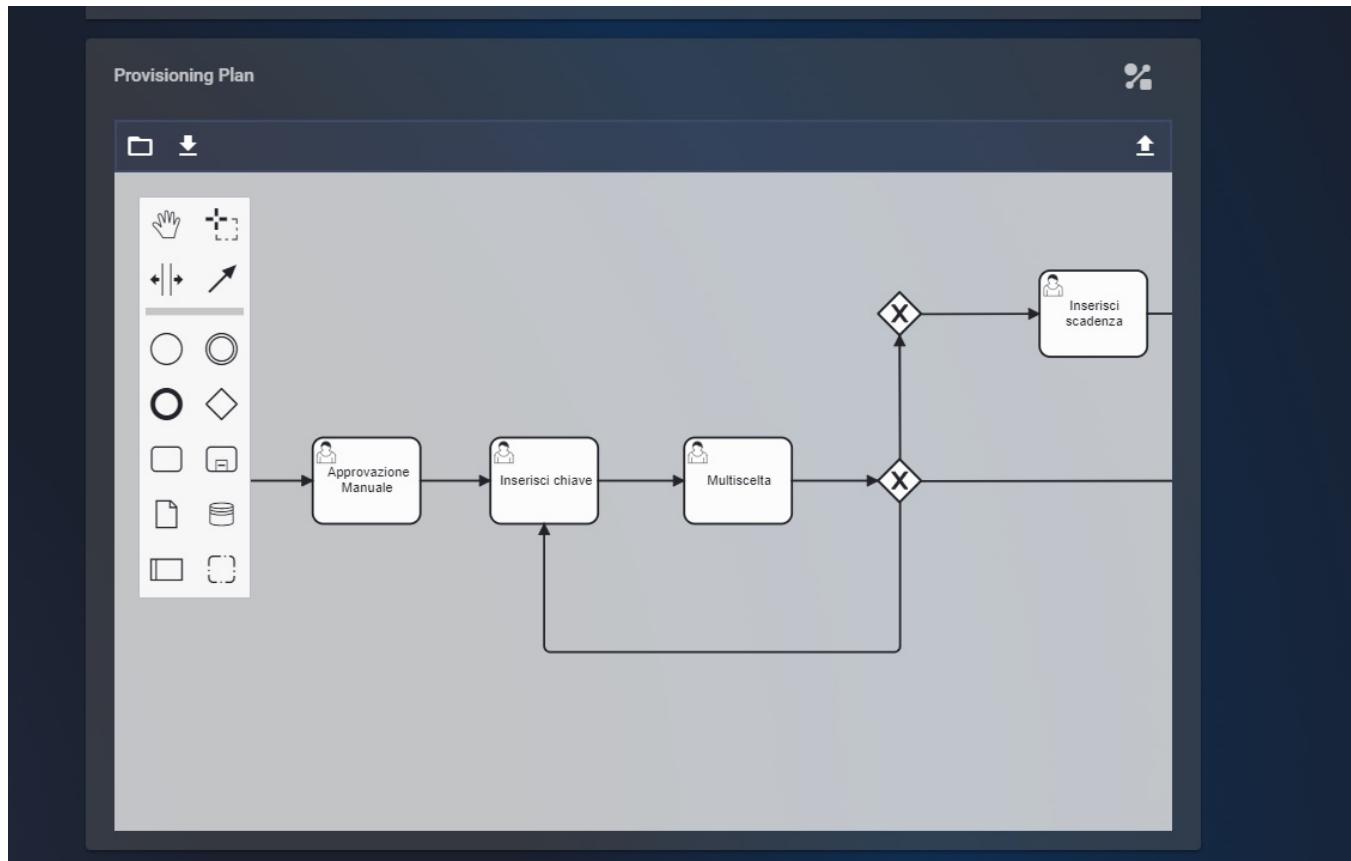


Figura 291 – Sezione Plan di una Blueprint

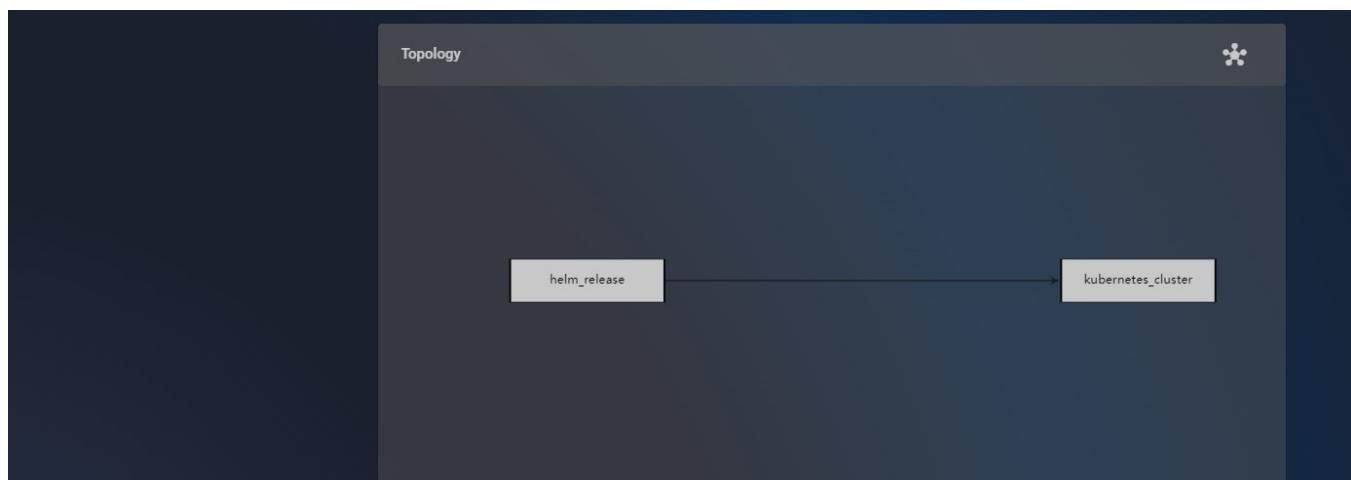


Figura 292 – Sezione Topology di una Blueprint



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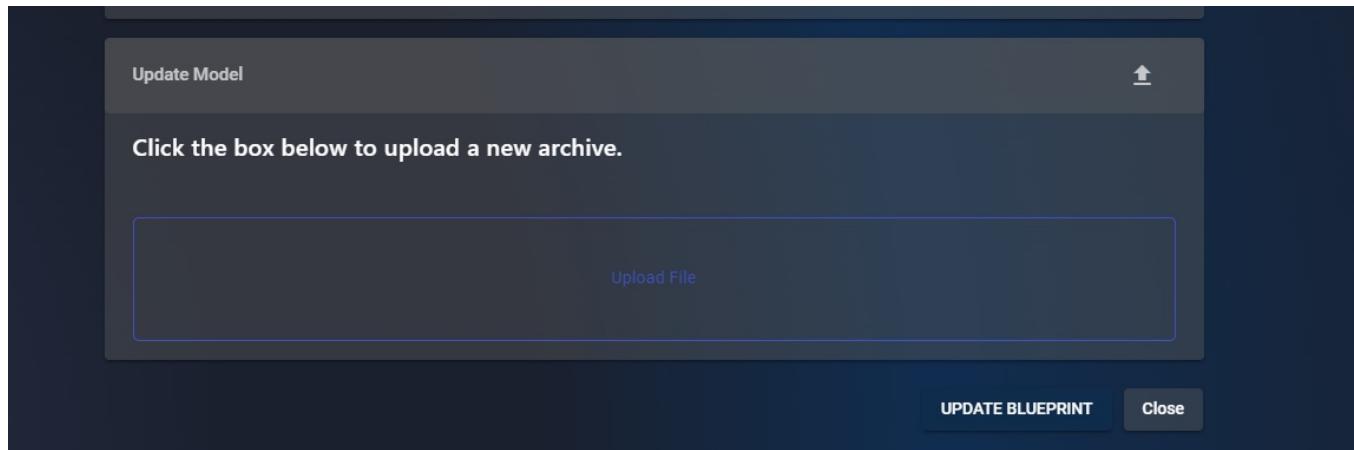


Figura 293 – Sezione Model di una Blueprint

The "Delete" functionality: allows permanently deleting the blueprint from the system. To do this, simply confirm the deletion by clicking the "Yes" button displayed in the deletion confirmation modal.

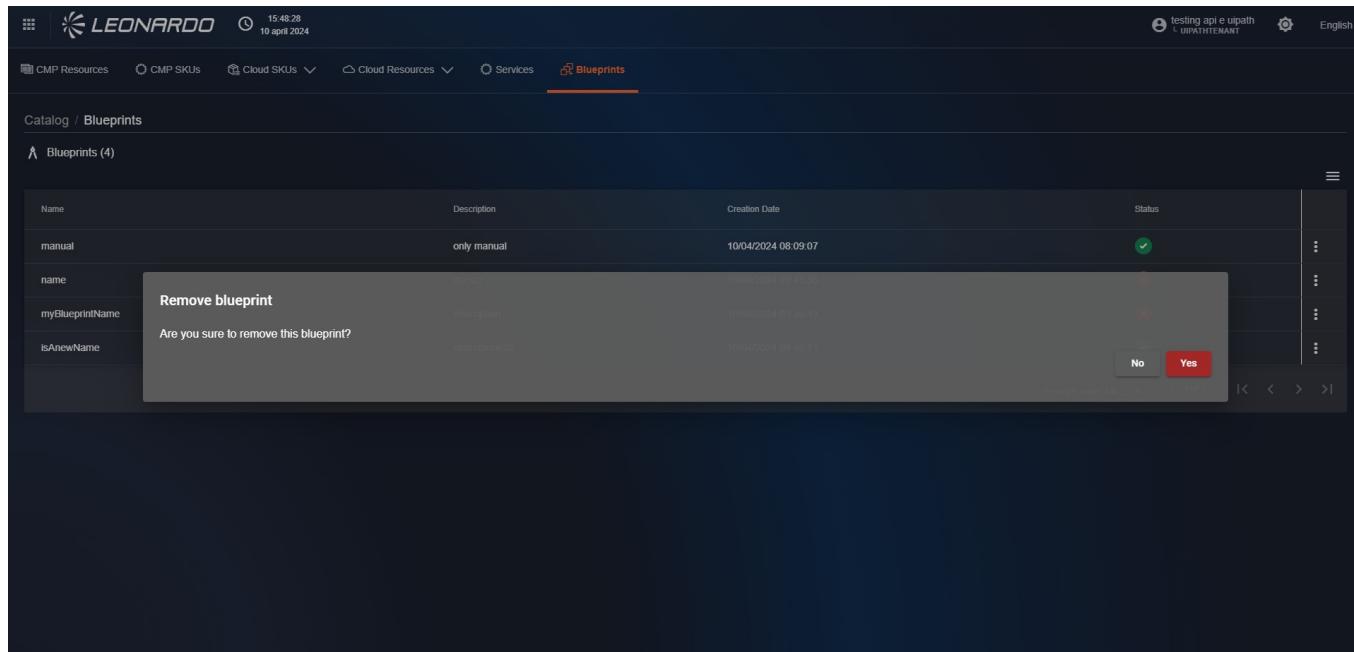


Figura 294 – Eliminazione di una Blueprint

9.0.4 Reporting Tools

The reporting functionality, specific to each feature, allows generating global reports of the information available for the various providers. Within the pages, the possibility will also be given to create files to facilitate information sharing.

To access the functionality, above the breadcrumb path, click on the "Reports" tab.

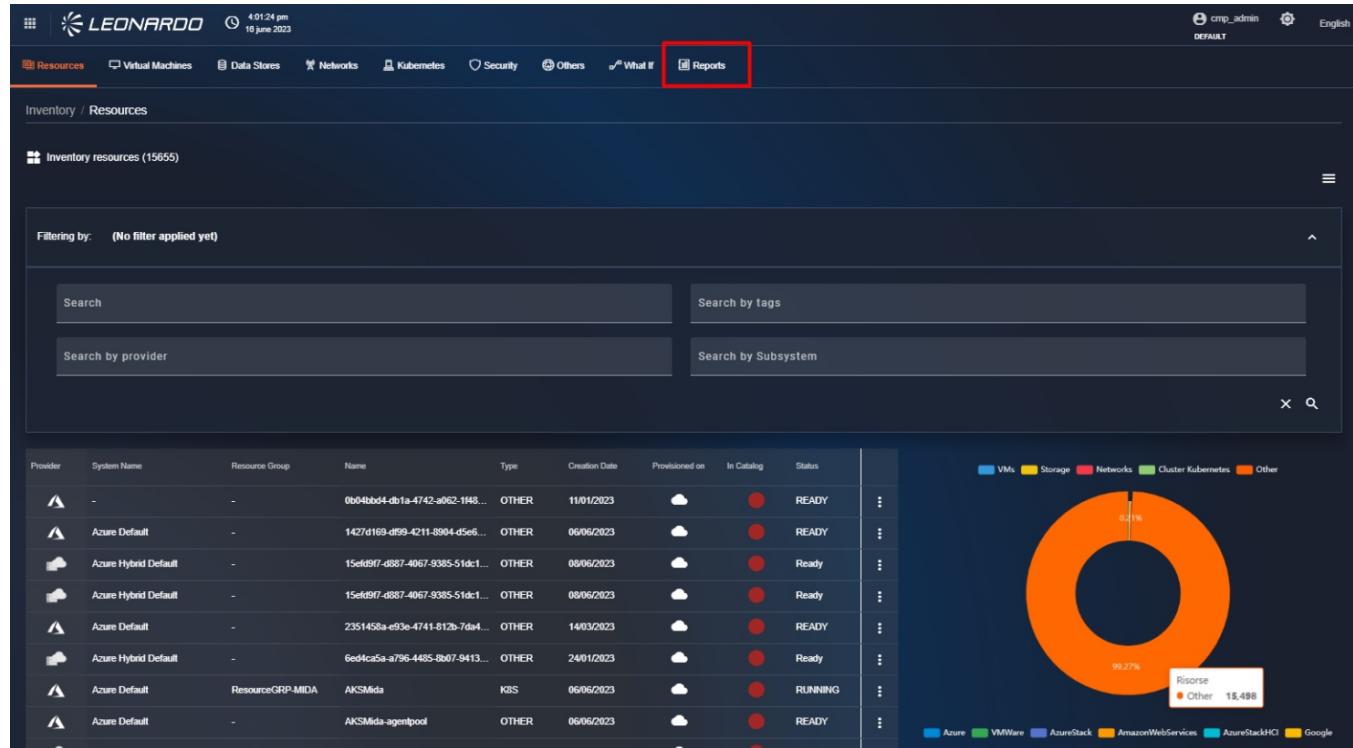


Figura 295 – Accesso al report di Catalogo

9.0.4.1 Available Report Types

CATALOG Missing SKU – List of provider SKUs not present in the SCMP catalog price list, if applicable. Consequently, the customer price for missing SKUs will be given by applying the discount/markup percentage configured in the Administration section.

9.0.4.2 Creating a Report

In the upper right of the page, we can click on the "New Report" button to start creating a report. Specifically, a modal will be displayed containing the list of available report types.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is currently selected. Below the navigation, there's a breadcrumb trail: Inventory / Reports. The main area displays a table of reports categorized as Ready or Scheduled. One report in the Ready category is highlighted, showing its details: Sub Category (SUMMARY), Provider (AZURE, GOOGLE, OPENSHIFT), Creation Date (10/06/2024 - 10:05 AM), Status (READY), and Actions (three dots). A modal window titled 'New report' is overlaid on the page. It contains a sub-header 'New report' with a gear icon, a message 'Select a report type from the list:', and a list item 'Inventory Summary' with a sub-description 'Report about the number of resources related to specific filters'. At the bottom of the modal are two buttons: 'Cancel' and 'Configure'.

Figura 296 – Creazione nuovo report

Once the report type is selected, click the "Configure" button to select the providers to include in the report. In the newly opened window, we find the "Provider" field which allows selecting one or more existing providers in the system. Subsequently, it is possible to select one or more subsystems to include in the report. If no providers are selected, no subsystem can be selected. Finally, there is a "tag" section to include only resources that have the entered tag.



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The screenshot shows a dark-themed web interface for the Leonardo Secure Cloud Management Platform. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is currently selected. Below the navigation, a sub-menu for 'Inventory / Reports' is open, showing 'Reports' as the active item. A modal dialog box titled 'Inventory' is displayed, prompting the user to select a provider ('Azure, Google') and a subsystem ('MAE LAB, CMPPROJECT-374610'). It also includes fields for Tags and Report Type (with 'One-Shot' selected). A 'Submit' button is at the bottom of the dialog. In the background, a table lists various reports with columns for Sub Category, Provider, Status, and Actions. The table rows include: SUMMARY (AZURE), SUMMARY (AZURE), SUMMARY (AZURE, GOOGLE, OPENSHIFT), SUMMARY (AZURE, GOOGLE, OPENSHIFT, KUBERNETES, OPENSHIFT).

Figura 297 – Configurazione del report

At this point, the user can choose between two different actions:

- Create a static report that will be saved in the system.
- Schedule a recurring report generation.

To confirm the creation of a static report, verify that "One-Shot" has been selected for the "Report type" field and click the "Submit" button at the bottom.

After a loading period, the newly generated report will be visible in the list.

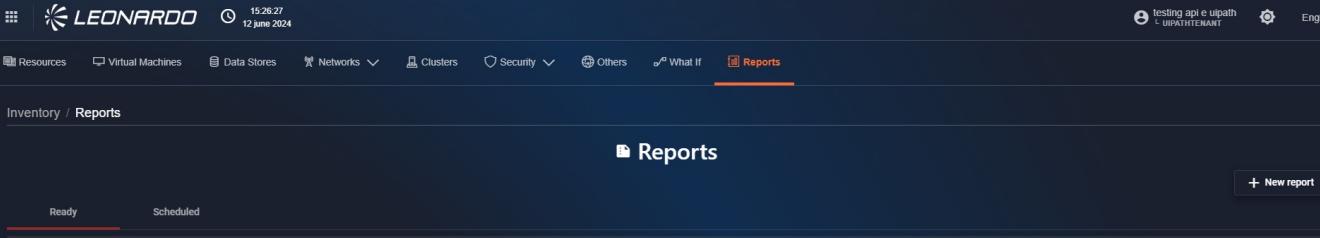


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The screenshot shows the Leonardo Cloud Platform interface. At the top, there's a header bar with the Leonardo logo, a timestamp (15:26:27, 12 June 2024), and user information (testing api e upath). Below the header is a navigation bar with links: Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports (which is highlighted with an orange underline). The main content area has a dark blue header with the title "Reports". Underneath, there are two tabs: "Ready" (selected) and "Scheduled". A button "+ New report" is located in the top right of this header. The main body contains a table with columns: Sub Category, Provider, Creation Date, Status, and Actions. The table lists 12 rows, all of which are "READY" and have three dots in the Actions column. The Sub Category values are mostly "SUMMARY" except for one row which is "AZURE, GOOGLE, OPENSHIFT".

Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 1:21 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮

Figura 298 – Lista dei report effettuati

9.0.4.2.1 REPORT SCHEDULING

If, on the other hand, you want to schedule automatic report execution, you will need to select "Recurring" for the "Report Type" field. In this case, the window will update to show additional parameters for configuring the periodic report.

The parameters to be entered are:

- Period: allows selecting the frequency of report delivery (hourly, daily, ...).
 - "Receive only if not empty" if selected, the file will not be sent if it contains no information.
 - Report Language: allows selecting the language used in the report.
 - File format: allows selecting one or more file types to include in the email.
 - User E-mails: allows entering an email to which reports will be sent. After entering an email, it is necessary to press "Enter" on the keyboard to confirm its entry. Once pressed, the newly entered email will move to the bottom box, and the field will be cleared to allow the entry of a new email, if necessary.



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The screenshot shows the 'Costs' report configuration dialog. It includes fields for 'Report Type' (One-Shot or Recurring), 'Period' (e.g., 'Last 7 days'), 'Report's language' (e.g., 'English'), 'File format' (e.g., 'Costs Details - Group By Resource'), and 'User E-mails' (e.g., 'FinOps Report'). A note at the bottom of the dialog box says: 'Press ENTER for each email you want to confirm and add to the list of recipients. It's possible to add multiple emails.'

Sub Category	Provider	Creation Date	Status	Actions
FINOPS COST	Azure, Google	15/04/2025	READY	...
FINOPS COST	Azure	15/04/2025	READY	...
DETAILS GROUP RESOURCE		15/04/2025	READY	...
DETAILS		15/04/2025	READY	...
SUMMARY GROUP RESOURCE		15/04/2025	READY	...
SUMMARY		15/04/2025	READY	...
FINOPS COST	Azure, Google	15/04/2025	READY	...
FINOPS COST	Azure	15/04/2025	READY	...
FINOPS COST	Azure	15/04/2025	READY	...
SUMMARY		15/04/2025	READY	...
SUMMARY		15/04/2025	READY	...

*Figura 299 – Parametri dei report
schedulati*

Having configured all parameters, the "Submit" button will become clickable. Click it to confirm the entry, and after a loading period, the newly generated report will be visible in the list.

The screenshot shows the 'Reports' section of the Leonardo platform. It lists scheduled reports with the following columns:

- Sub Category
- Provider
- Creation Date
- Status
- Actions

The reports listed are:

Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 1:21 PM	READY	...
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	...
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	06/06/2024 - 12:29 AM	READY	...
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	...



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Figura 300 – Lista dei report effettuati

9.0.4.2.2 LIST OF SCHEDULED REPORTS

To view the list of scheduled reports, select the "Scheduled" tab in the upper left of the reports page.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with various links like Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is underlined in orange. Below the navigation, it says 'Inventory / Reports'. On the left, there are two tabs: 'Ready' and 'Scheduled', with 'Scheduled' being the active one. There's also a 'New report' button. The main area shows a table with columns: Period (Hourly), Language (EN), Recipients (noame@gmail.com), and Last sent (12/06/2024 - 1:21 PM). At the bottom right, there are pagination controls for items per page (20) and a total of 1 item.

Figura 301 – Lista dei report schedulati

On this page, you will find the list and related information of the scheduled reports present in the system. For each result, it is possible, by clicking the "Three dots" button on the right, to perform three operations:

- View the last generated report.
- Edit the schedule settings; it will not be possible to modify the selected providers or subsystems.
- Delete the schedule to stop sending emails.



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Figura 302 – Modifica di una schedule

9.0.4.2.3 USING REPORTS

Clicking on a row of a static report, or using the "Show report" button available for scheduled reports, will display the detail page of the selected report.

In the summary of the Inventory report, there is a "Stats" section which contains the number of disks, interfaces, networks, and virtual machines belonging to the selected provider.

Below the "Stats" section, there are the filters used by the user to generate the report.

Below the filters, there is a summary table of resources belonging to the providers. On the right, there are two buttons: "PRINT" and "EXPORT".

Clicking the "PRINT" button, a print preview modal appears. To print the report, click the "Print" button in the bottom right, at which point the printing of said report will begin.

Clicking the "EXPORT" button, it is possible to export the report in ".csv", ".json", or ".pdf" format.

To return to the "Results" tab, in the bottom right, click the "CLOSE" button or in the upper left, click the left-pointing arrow, next to the report title.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is underlined, indicating it's the active section. Below the navigation is a breadcrumb trail: Inventory / Reports / Report 6669a0d3aae316468b3c8b34. The main content area is titled "Report Inventory Summary". It features a "Stats" section with five boxes: 1 VMs, 1 Disks, 1 Networks, 0 Interfaces, and 0 K8Ss. Below this is a table titled "PROVIDER: AZURE, GOOGLE | SUBSYSTEM: MAE LAB,CMPPROJECT-374610". The table has columns for Type Provider, Subsystem Name, VMs, Disks, Networks, Interfaces, and K8Ss. It lists two entries: Azure (MAE LAB) with 14 VMs, 16 Disks, 14 Networks, 0 Interfaces, and 0 K8Ss; and Google (CMPPROJECT-374610) with 1 VM, 1 Disk, 1 Network, 0 Interfaces, and 0 K8Ss. At the bottom right of the table are buttons for "PRINT" and "EXPORT".

Type Provider	Subsystem Name	VMs	Disks	Networks	Interfaces	K8Ss
Azure	MAE LAB	14	16	14	0	0
Google	CMPPROJECT-374610	1	1	1	0	0

Figura 303 – Dettagli dei report



Cost and Usages

SCMP collects, through the APIs made available by the providers, the cost details of inventory assets.

In the event that providers do not expose cost data, this data can be editorially entered into the catalog so that it can then be counted within this functionality.

Costs are collected with a breakdown by daily cost and by resource. Subsequently, as with the metrics section, the data is normalized and aggregated to allow for a uniform dashboard visualization.

■ Attention

As also indicated on the cost dashboards, data related to the last 48 hours has not yet been confirmed by the respective providers. We can use this table as a reference, but for details, it is necessary to check the specific provider's documentation.

For example:

Cloud Provider	Tool/Method	Update Times	Notes
Azure	Cost using export file	6/7 days	in the first 6 days of the following month, the costs of the previous month are consolidated
Azure	Cost Management	8-24 hours	Consolidated data updated within 24/48 hours; greater delay compared to others.
Google Cloud	Billing Dashboard	A few hours, maximum 24 hours	Near real-time updates; consolidation up to 24 hours.
Google Cloud	BigQuery Export	Every hour	Minimum delay for advanced analysis via BigQuery.
Oracle Cloud	Cost Analysis	4-6 hours, maximum 24 hours	some services may have greater delays.
AWS	Cost Explorer	8-24 hours	Aggregated data updated within 12-24 hours.
AWS	Cost and Usage Reports (CUR)	8-24 hours	Detailed reports with similar delay.
AWS	CloudWatch Metrics (Billing)	Every 6 hours	Near real-time monitoring.

Cloud Provider	Tool/Method	Update Times	Notes
AWS	Budget Alerts	3-5 hours	Rapid notifications when budget thresholds are exceeded.

Cost Dashboard

To access the cost section, use the menu as shown in the figure.



Figura 304 – Access to Costs

At this point, the user will find themselves within the "Dashboard" tab page of costs. On this screen, we can note in order:

- The "Cost trend" value, which indicates the total costs for the selected period.
- The "Cost difference" value, which indicates the markup applied in the selected period.
- A "Cloud provider Spend" bar chart, which indicates the cost billed to the client for each provider in the selected period.
- An "Effective Spend" bar chart, which indicates the effective cost of resources on the provider.

At the bottom, there will be several resource aggregation charts, for example, by Region or Service Type, as indicated by the respective cloud providers, and as we will analyze later, it will be possible to customize the available charts and sections.



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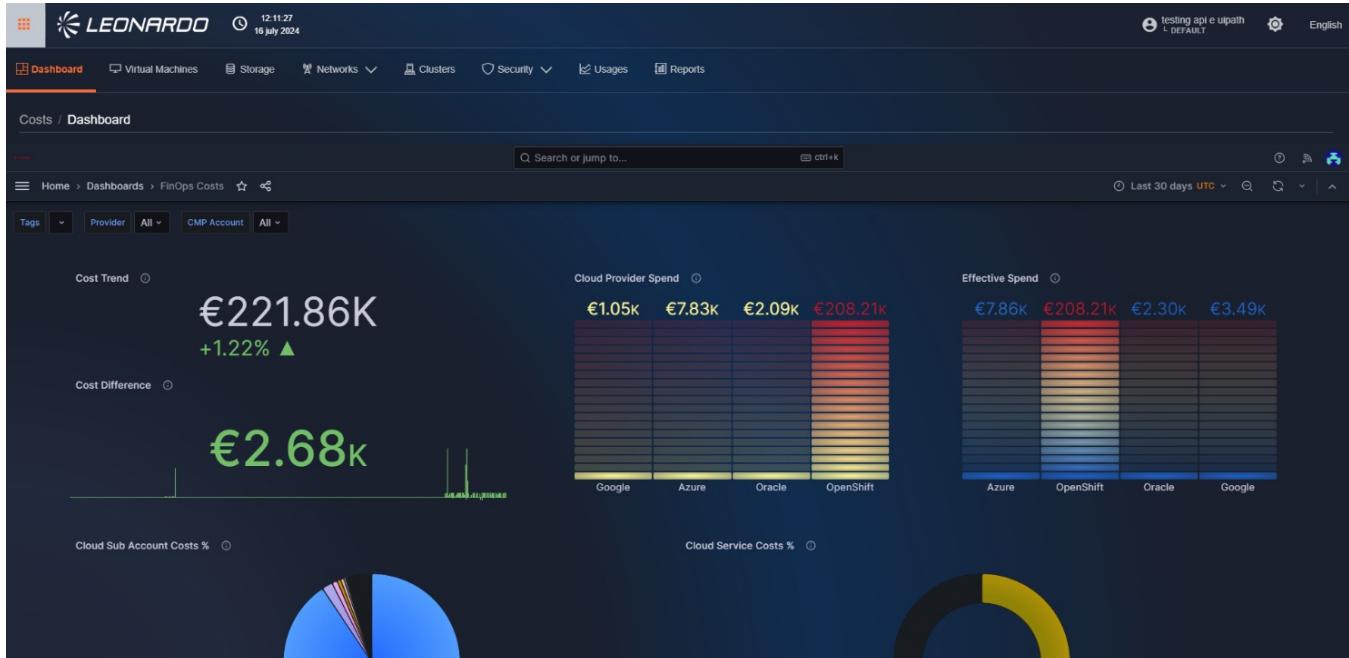


Figura 305 – Cost Dashboard

In the cost functionality, it is possible to filter by resource type using the tab bar at the top, while for a general view, the dashboard can be used.

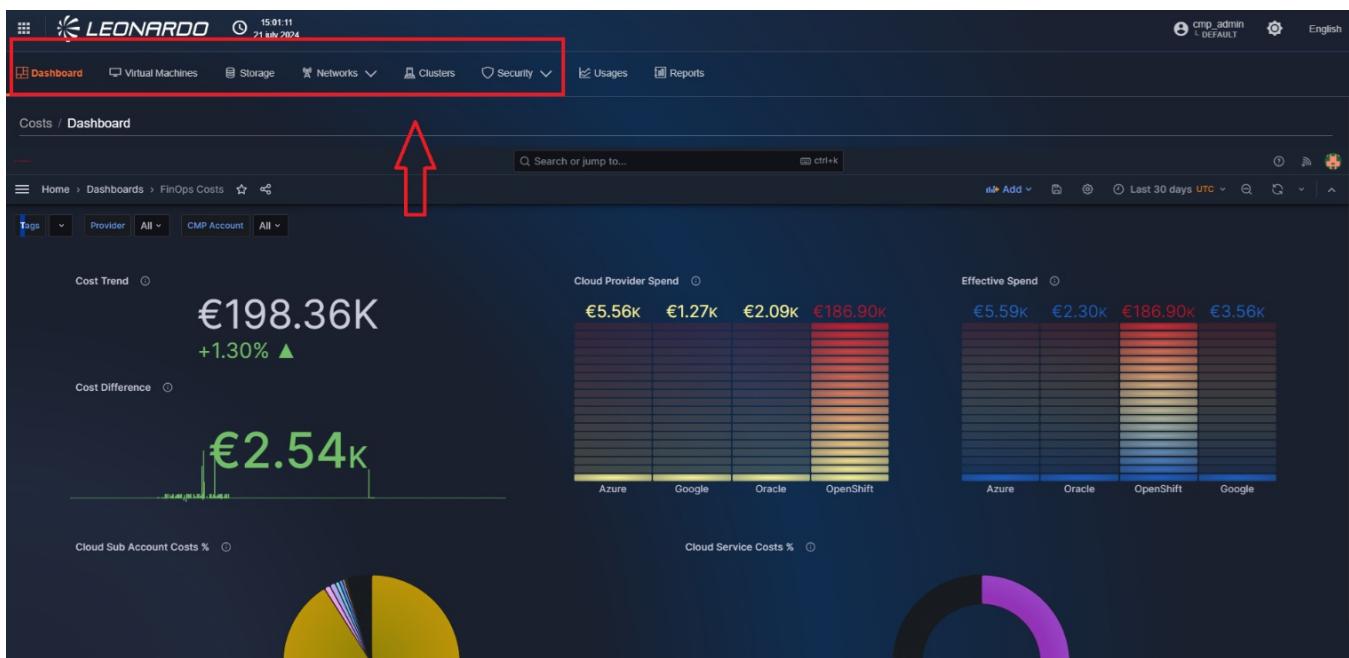


Figura 306 – Filter by resource type

Cost Section Filters

Within the page, a series of filters are available that can be selected simultaneously to filter the dashboard results.

The main filter is the display period, which can be found in the upper right. Clicking on it will open a selection window (in yellow in the figure) where it will be possible to either enter a custom time range, using the "From" and "To" fields on the left, or select a "smart" time range by clicking directly on the desired choice in the scrollable section on the right.

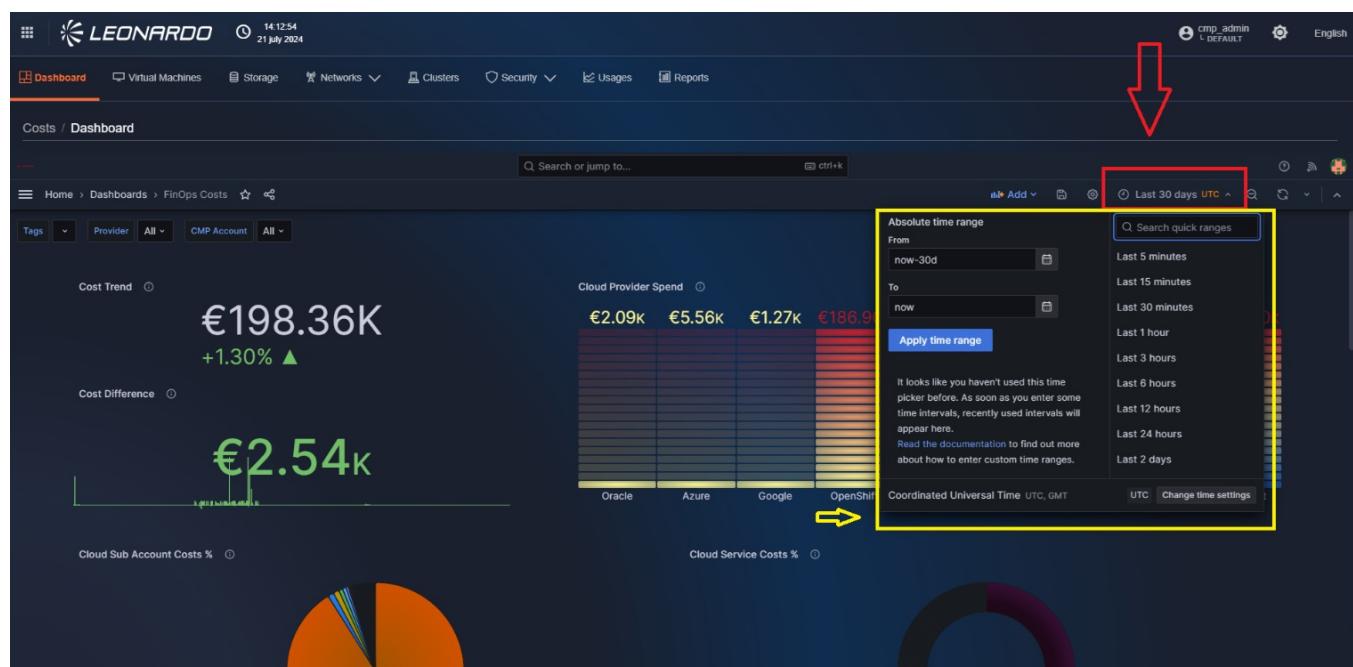


Figura 307 – Cost time filter

A series of filters are available in the upper left of the page, allowing you to filter the retrieved resources. Specifically, you can filter by:

- Tag
- Provider type
- Subsystem name.

These filters allow multiple values to be selected and can be combined to achieve the desired granularity



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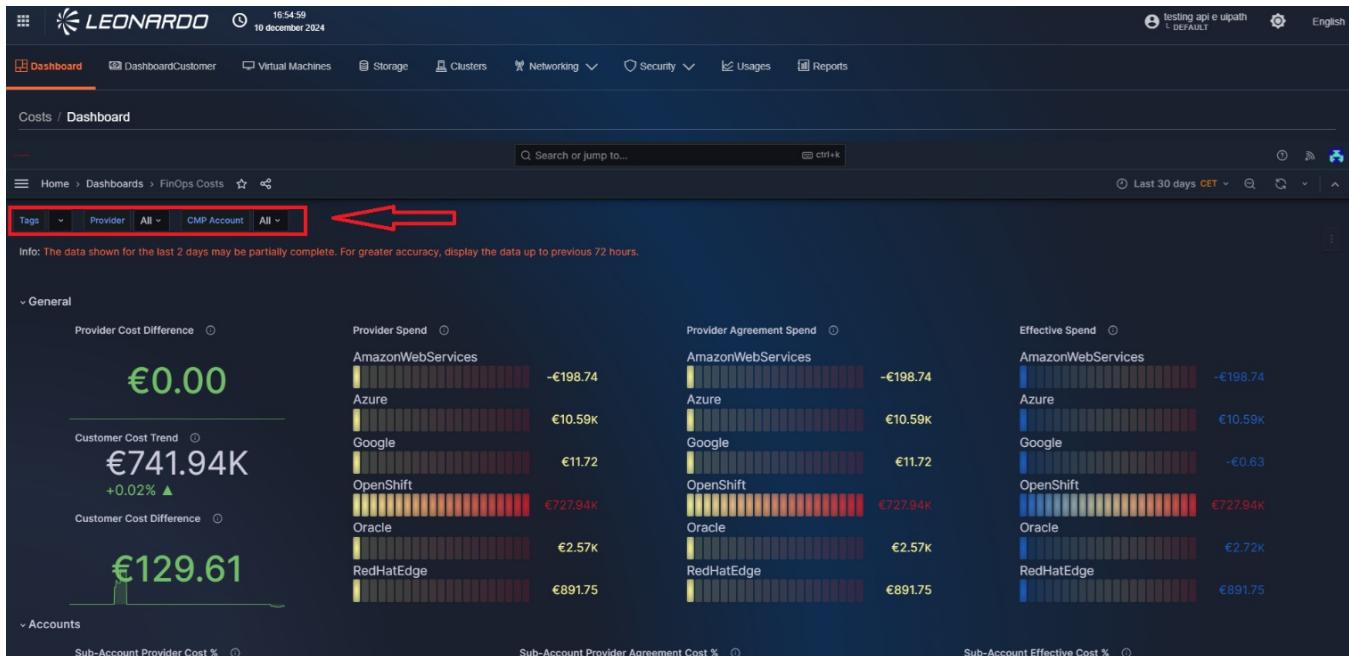


Figura 308 – Cost functionality filters

Overview of the data shown

"GENERAL" SECTION

In the first section, summary charts representing provider and SCMP costs are shown to the user based on the applied filters.

In detail:

- **Provider Cost Difference:** chart containing the cost difference between the sum of the original provider costs and the sum of the costs agreed upon with the provider.
Useful for identifying savings obtained through negotiation or resale compared to list prices.
- **Customer Cost Difference:** chart containing the cost difference between the sum of SCMP costs charged to the customer and the sum of the original provider costs.
Used to monitor profit margins and the competitiveness of prices offered to the customer.
- **Customer Cost Trend:** chart containing the total SCMP costs charged to the customer, with the respective profit/loss percentage.
Allows observing economic trends over time and detecting cost peaks or anomalies.
- **Provider Spend:** chart containing the sum of original costs for each provider.
Allows identifying which providers the spending is concentrated on and the level of dependency.

- **Provider Agreement Spend:** chart containing the sum of agreed costs for each provider.
Useful for comparing the effectiveness of commercial agreements with each provider.
- **Effective Spend:** chart containing the sum of SCMP costs charged to the customer for each provider.
Helps evaluate the profitability obtained from each provider.

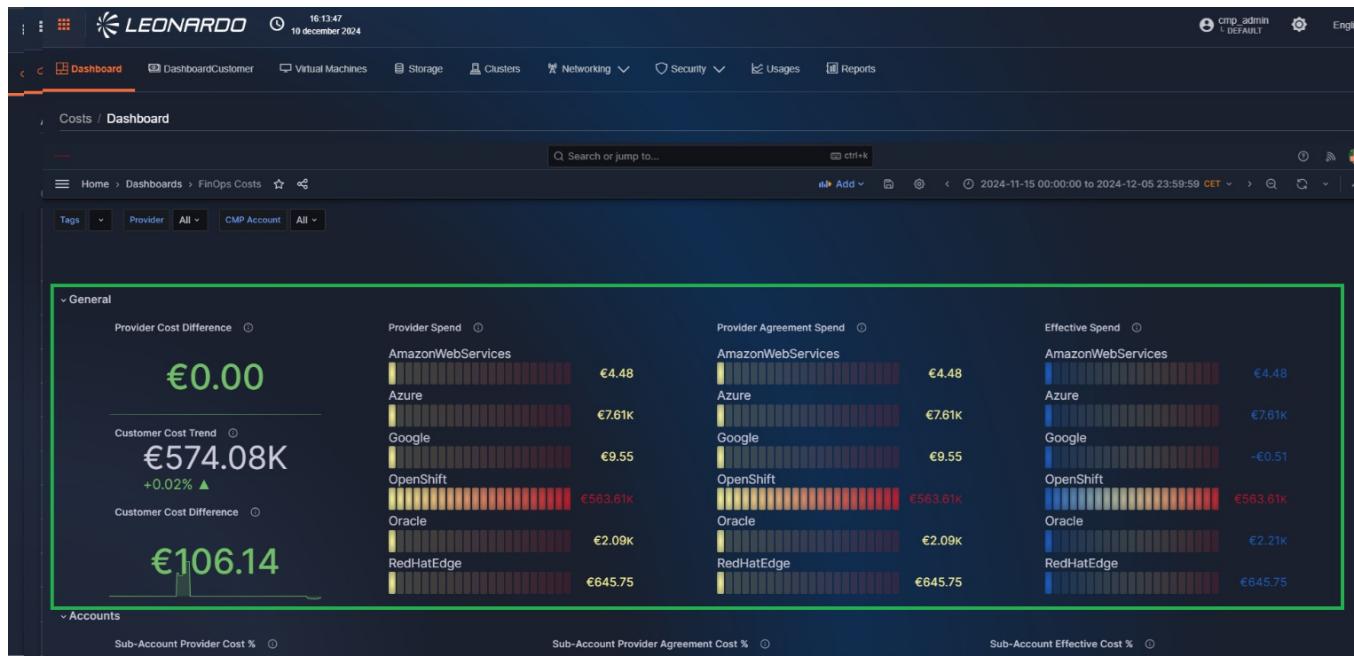


Figura 309 – General

"ACCOUNTS" SECTION

In the second section, charts focused on the costs generated by each subordinate account of each provider are shown to the user.

In detail:

- **Sub-Account Provider Cost %:** Percentage of the total provider cost, for each account.
Used to identify the most expensive accounts and analyze the distributed economic load.
- **Sub-Account Provider Agreement Cost %:** Percentage of the total agreed provider cost, for each subordinate account.
Useful for checking which accounts benefit from more significant discounts.
- **Sub-Account Effective Cost %:** Percentage of the total SCMP cost charged to the customer, for each subordinate account.
Allows seeing which accounts generate more revenue.

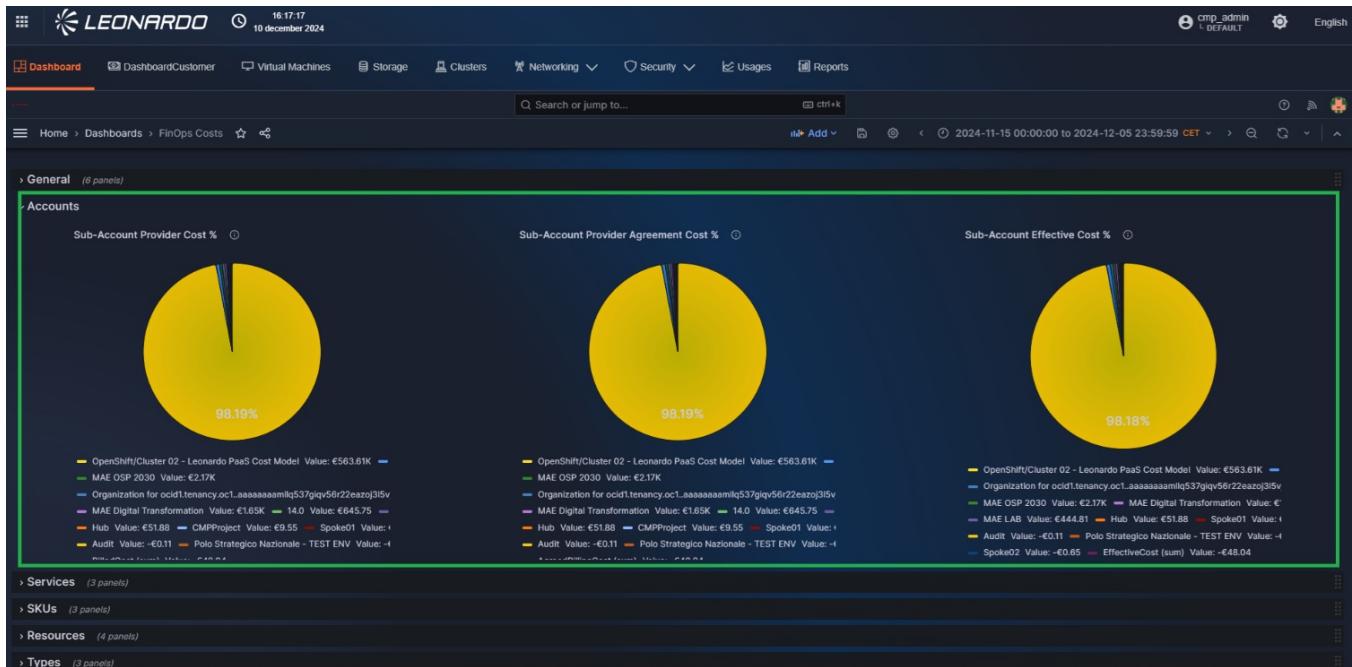


Figura 310 – Accounts

"SERVICES" SECTION

In the third section, charts focused on the costs generated by each cloud service of each provider are shown to the user.

In detail:

- **Service Provider Cost %:** Percentage of the total provider cost, for each service.
Allows understanding which services (e.g., compute, storage, network) have the most impact on costs.
- **Service Provider Agreement Cost %:** Percentage of the total agreed provider cost, for each service.
Useful for analyzing the effectiveness of negotiations on various services.
- **Service Effective Cost %:** Percentage of the total SCMP cost charged to the customer, for each service.
Provides a clear view of the main revenue sources per service.



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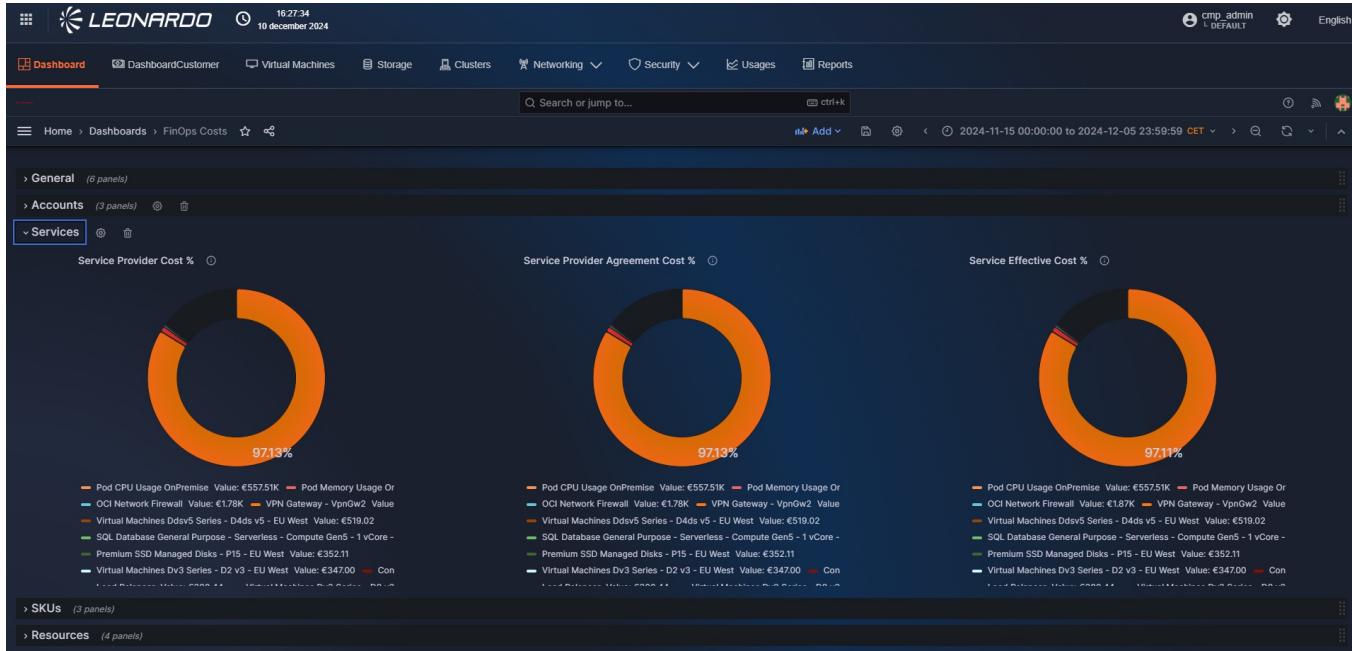


Figura 311 – Services

"SKUs" SECTION

In the fourth section, charts focused on the costs generated by each SKU of each provider are shown to the user.

In detail:

- Sku Provider Cost %:** Percentage of the total provider cost, for each SKU.
Allows detailed cost analysis at the billing unit level.
- Sku Provider Agreement Cost %:** Percentage of the total agreed provider cost, for each SKU.
Useful for evaluating whether individual SKUs also benefit from discounts and optimizations.
- Sku Effective Cost %:** Percentage of the total SCMP cost charged to the customer, for each SKU.
Helps highlight any imbalances in margins at the SKU level.



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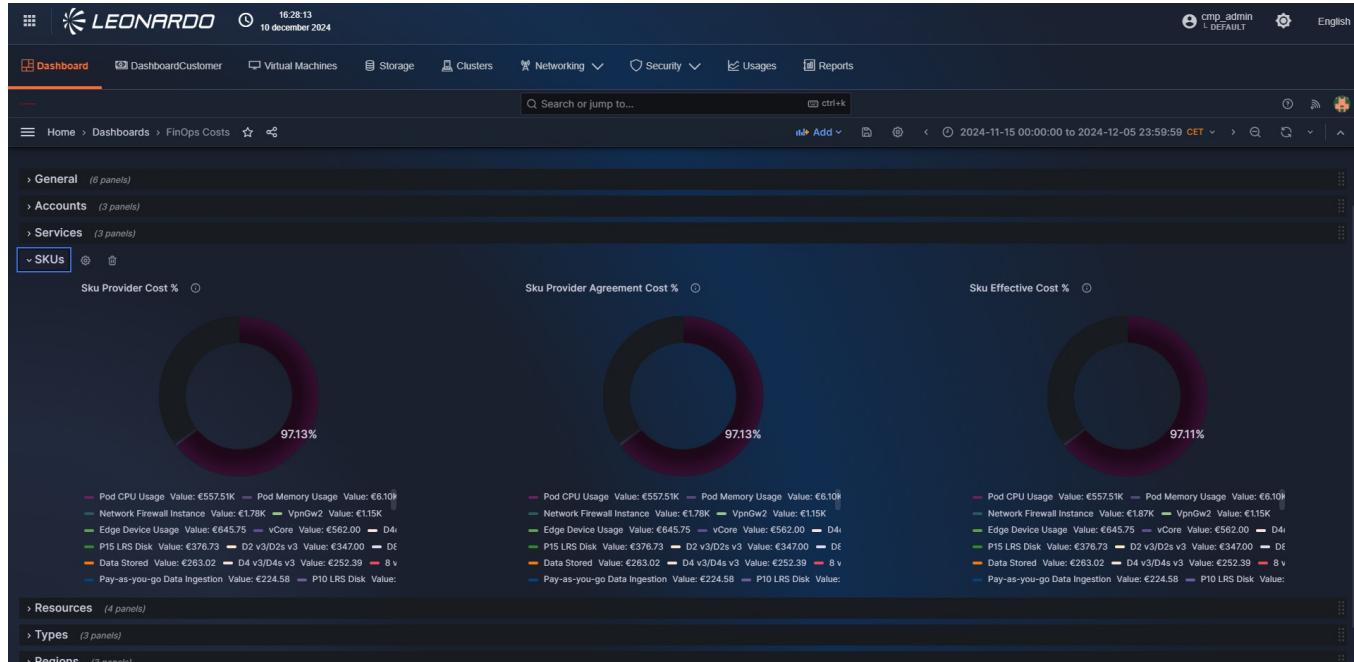


Figura 312 – Skus

"RESOURCES" SECTION

In the fifth section, charts focused on the costs generated by each resource of each provider are shown to the user.

In detail:

- **Resource Provider Cost %:** Percentage of the total provider cost, for each resource.
Allows the identification of particularly expensive or underutilized resources.
- **Resource Provider Agreement Cost %:** Percentage of the total agreed provider cost, for each resource.
Allows seeing if discounts are distributed equally among resources.
- **Resource Effective Cost %:** Percentage of the total SCMP cost charged to the customer, for each resource.
Provides visibility into the profitability of individual resources.



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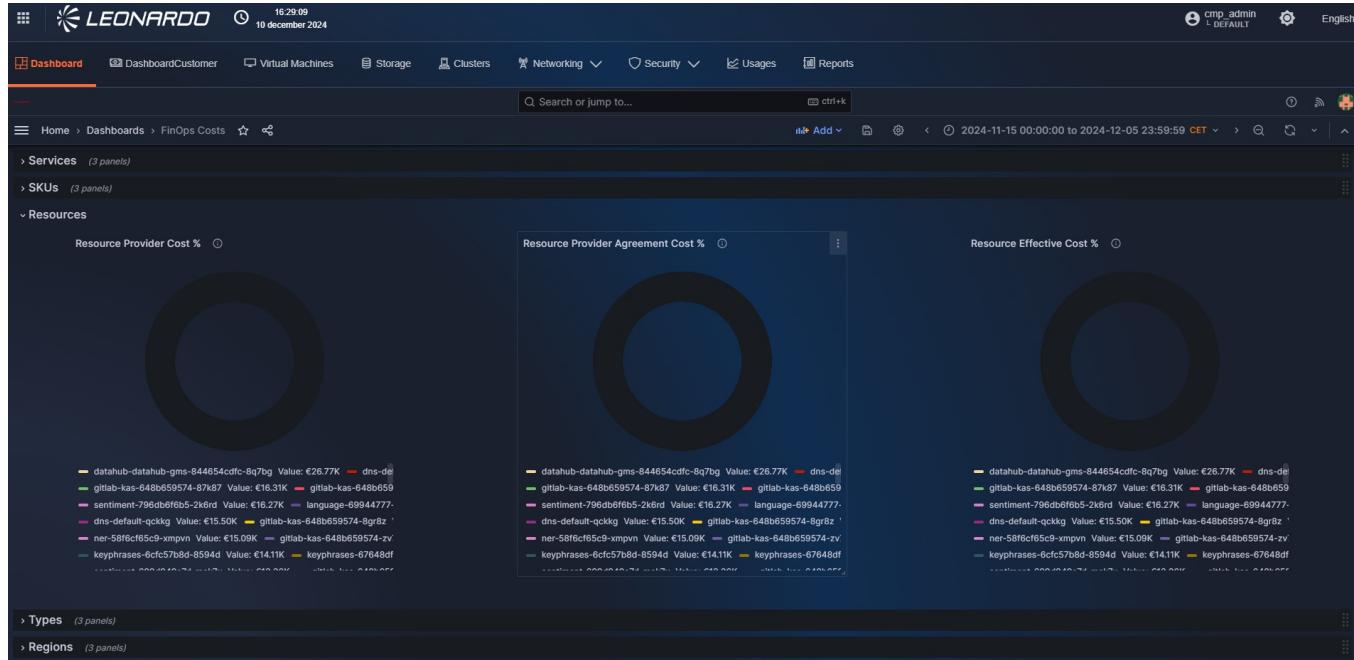


Figura 313 – Resources

"TYPES" SECTION

In the sixth section, charts focused on the costs generated by each inventory resource type of each provider are shown to the user.

In detail:

- **Resource Type Provider Cost %:** Percentage of the total provider cost, for each resource type.
Offers an aggregated view useful for cost planning.
- **Resource Type Provider Agreement Cost %:** Percentage of the total agreed provider cost, for each resource type.
Helps understand which types are most optimized through agreements.
- **Resource Type Effective Cost %:** Percentage of the total SCMP cost charged to the customer, for each resource type.
Allows measuring the commercial weight of each category.



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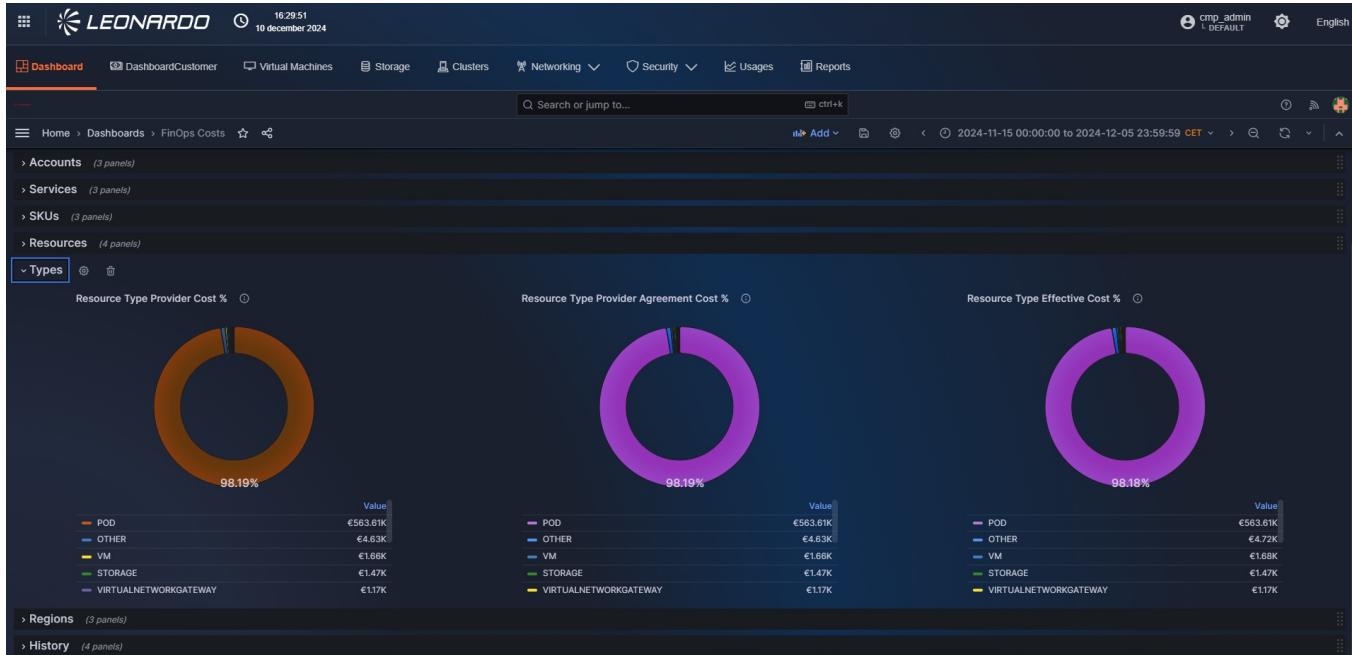


Figura 314 – Types

"REGIONS" SECTION

In the seventh section, charts focused on the costs generated in each region of each provider are shown to the user.

In detail:

- **Regional Provider Cost %:** Percentage of the total provider cost, for each region.
Indicates where resources are geographically located and their associated expenses.
- **Regional Provider Agreement Cost %:** Percentage of the total agreed provider cost, for each region.
Allows evaluating the convenience of chosen regions based on discounts.
- **Regional Effective Cost %:** Percentage of the total SCMP cost charged to the customer, for each region.
Useful for analyzing the distribution of revenue by geographical area.



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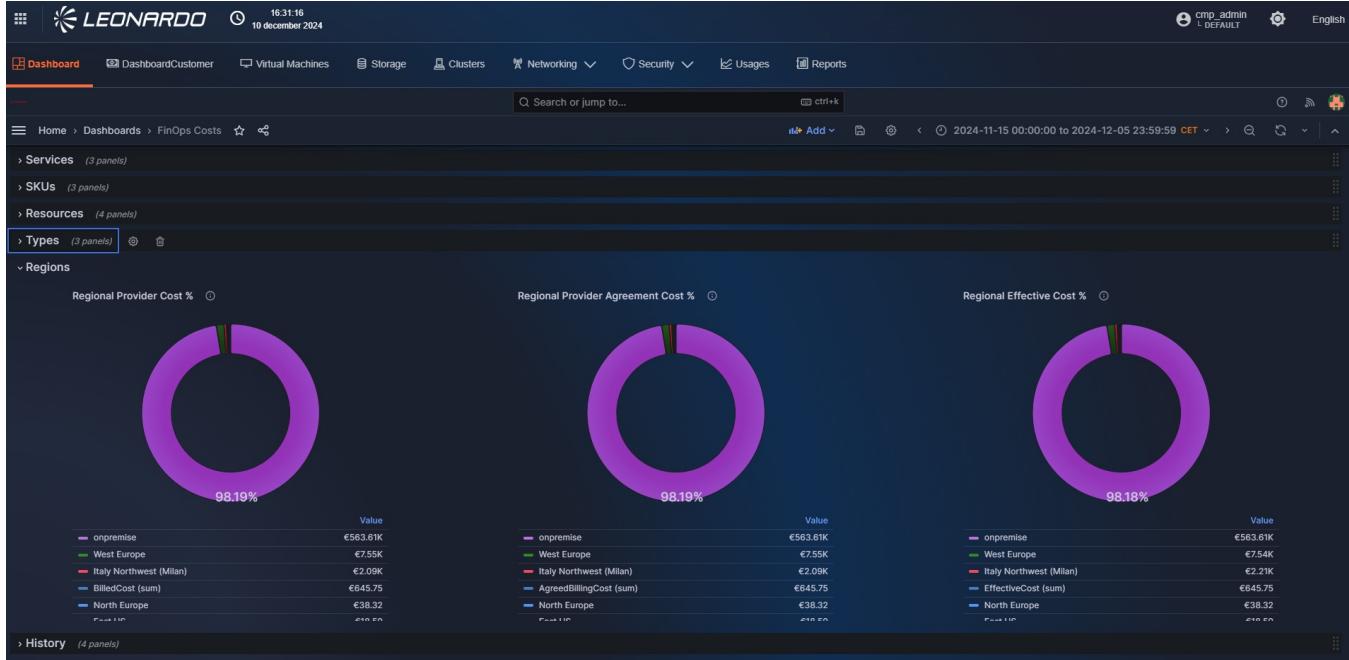


Figura 315 – Regions

"HISTORY" SECTION

Finally, in the eighth section, charts focused on the historical costs of each billing account, generated by each subsystem integrated into the SCMP, are shown to the user.

In detail:

- **System Costs Details:** Comparison between the total provider cost, the total agreed provider cost, and the total customer cost, for all subsystems integrated into the SCMP.
Fundamental for retrospective analysis and for evaluating the economic sustainability of the system.
- **Historical Provider Billing Costs:** History of the trend of total costs for each cloud billing account.
Helps predict future trends and anticipate spending or budget issues.



Figura 316 – History

Limited view for the customer

If a user configured with the "LIMITED" parameter is used to access the cost dashboard, the charts available on the dashboard will only relate to the recalculated SCMP costs, while the actual costs received from the providers will not be visible as they are superfluous, as can be seen in the image.



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Figura 317 – Limited cost dashboard

"Usage" Dashboard

In addition to the main cost dashboard and its related detailed dashboards by resource type, in the SCMP Costs module, the user can view an additional dashboard, focused on the consumption of inventory resources integrated into the platform.

By navigating to the Usages section of the module, generic and detailed information on the consumption of individual integrated services/SKUs and their respective resources will be shown.

To access the functionality, above the breadcrumb path, click on the "Usages" tab.

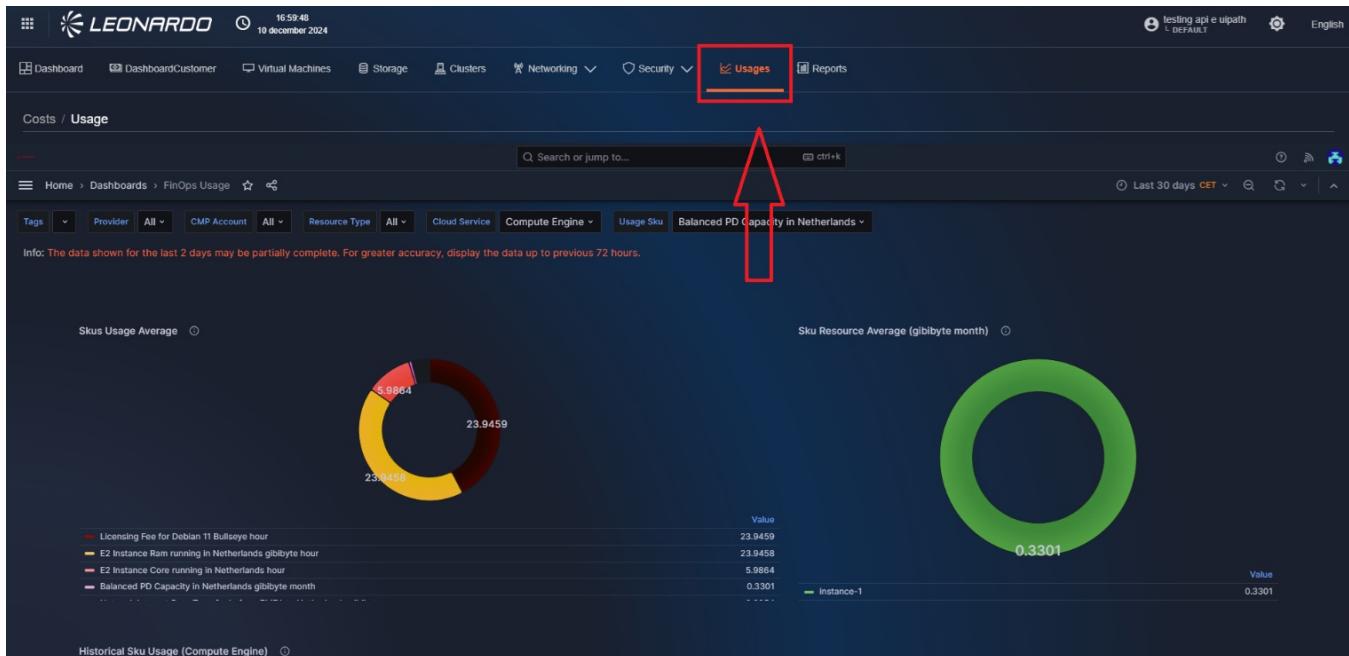


Figura 318 – Access to "Usages"

Usage section filters

Within the page, a series of filters are available that can be selected simultaneously to filter the dashboard results.

The main filter is the display period, which can be found in the upper right. Clicking on it will open a selection window (in yellow in the figure) where it will be possible to either enter a custom time range, using the "From" and "To" fields on the left, or select a "smart" time range by clicking directly on the desired choice in the scrollable section on the right.



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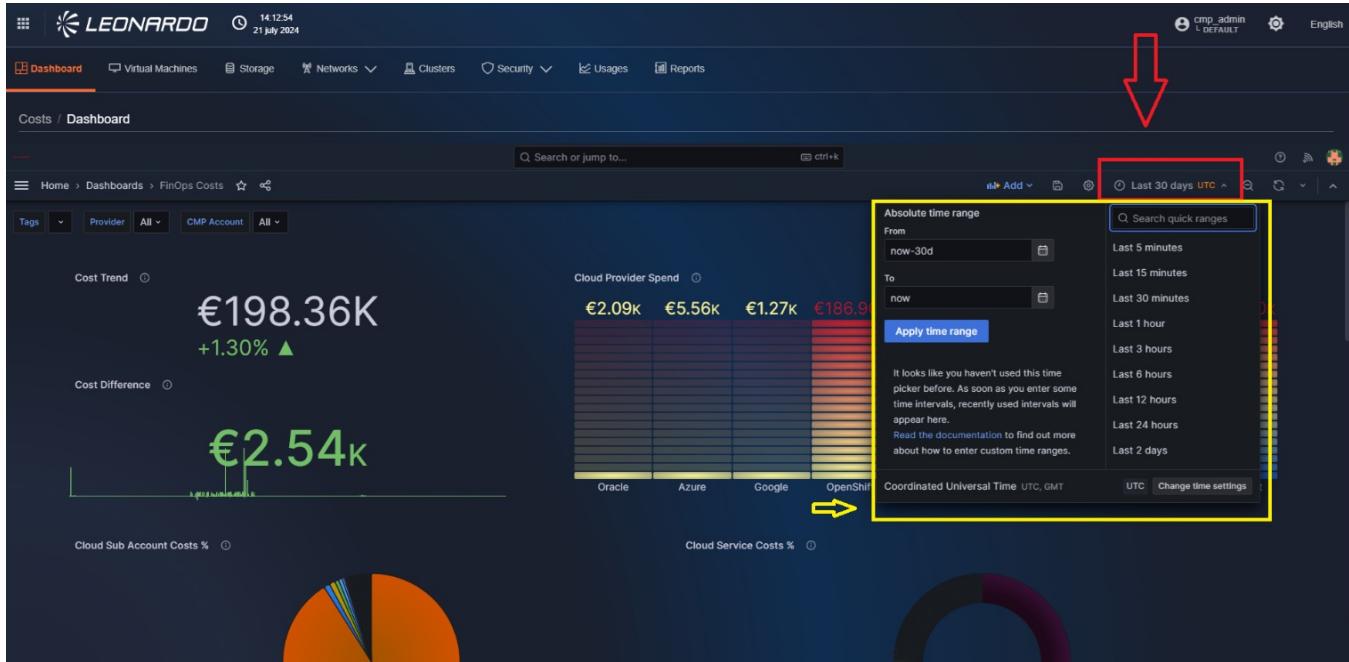


Figura 319 – Usage time filter

A series of filters are available in the upper left of the page, allowing you to filter the retrieved resources. Specifically, you can filter by:

- Tag
- Provider type
- Subsystem name.
- Resource type
- Cloud service name
- Cloud SKU name

These filters allow multiple values to be selected and can be combined to achieve the desired granularity.

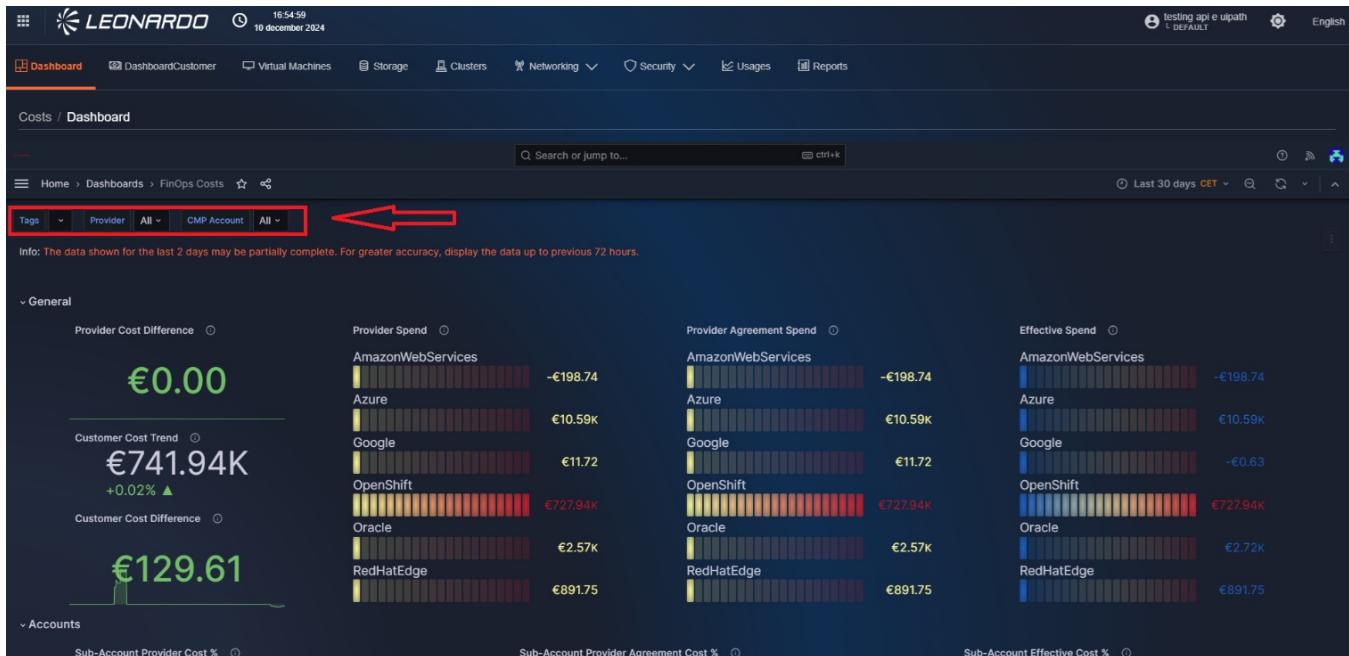


Figura 320 – Cost functionality filters

Overview of the data shown in the costs section

"SKUS USAGE AVERAGE" SECTION

The first chart represents the daily average consumed by each SKU. It is a summary chart that shows the user the general trend of consumption.

For each SKU, in fact, the average consumption and the unit of measure are indicated, within the specified time range, to briefly show which of them are, on average, most used and consequently which of them could generate higher costs for the user.



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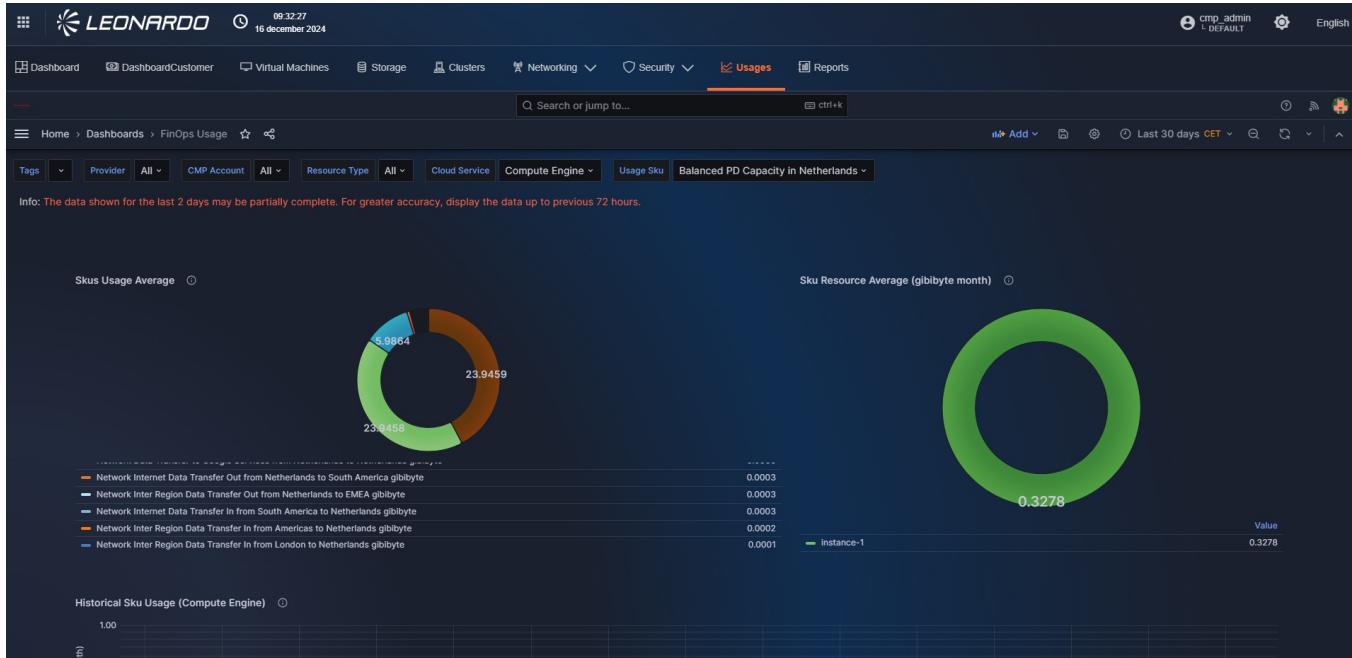


Figura 321 – "SKUs Usage" Section

"SKU RESOURCE AVERAGE" SECTION

The second chart, on the other hand, is focused on the SKU selected as a filter by the user and shows the daily average consumed by each resource, correlated to the specific SKU.

It too can be classified as a summary chart that provides the user with which resources for a given SKU are, on average, most used and consequently which of them could generate higher costs for the user.



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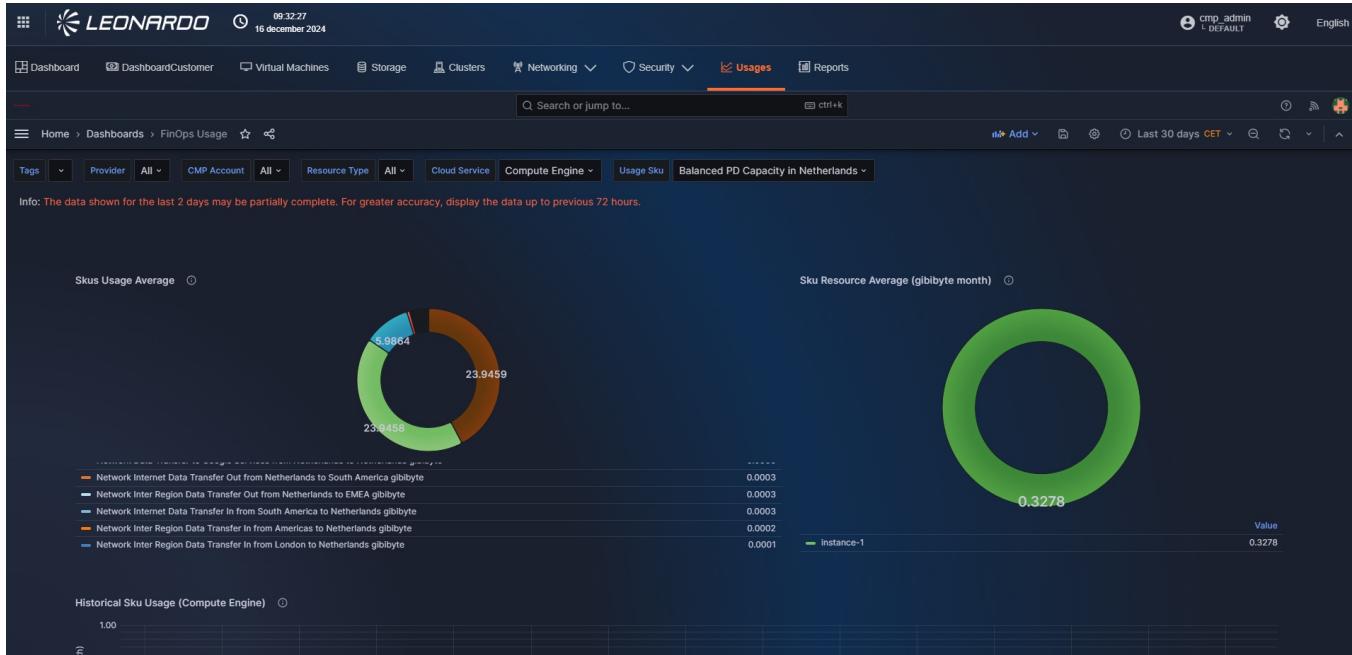


Figura 322 – "SKU resource" Section

"HISTORICAL SKU USAGE" SECTION

The first temporal chart shows the daily consumption trend of the specific SKU, selected as a filter in the dashboard.

In the case shown, a constant consumption (in hours) over time is highlighted, useful for the user for subsequent analysis phases.



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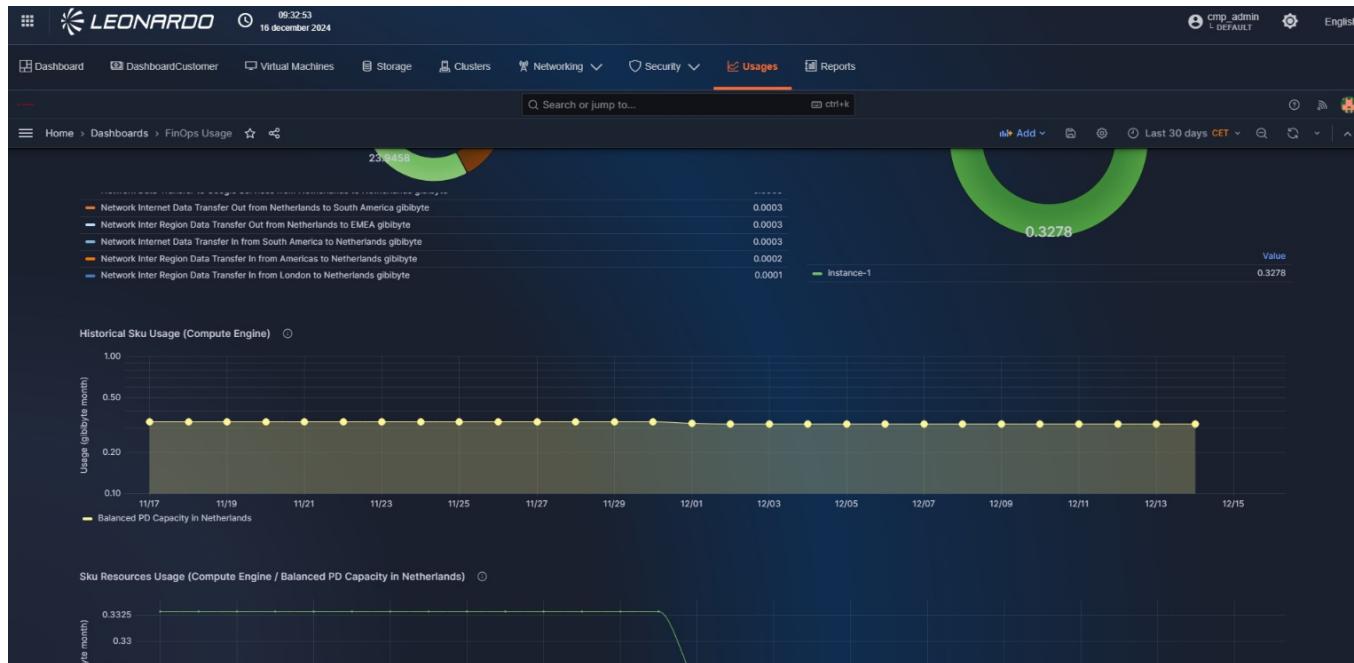


Figura 323 – "Historical SKU" Section

"SKU RESOURCES USAGE" SECTION

The second temporal chart, on the other hand, shows the daily consumption trend of the specific SKU, for each resource related to it.

This chart, therefore, shows the user the historical detail of the previous chart, highlighting which resources are involved in the consumption of the specific SKU and to what extent.

This last chart is particularly useful to the user because it highlights which resources are actually used within a specific SKU and, consequently, which of them could lead to higher costs for the user or be paid for without even being used.



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Figura 324 – "SKU Resources" Section

Cost and Usage dashboard customization

For dashboard customization, please consult the official guide

Reporting Tools

The reporting functionality, specific per feature, allows generating global reports of the information available for the various providers. Within the pages, the possibility to create files to facilitate information sharing will also be provided.

To access the functionality, above the breadcrumb path, click on the "Reports" tab

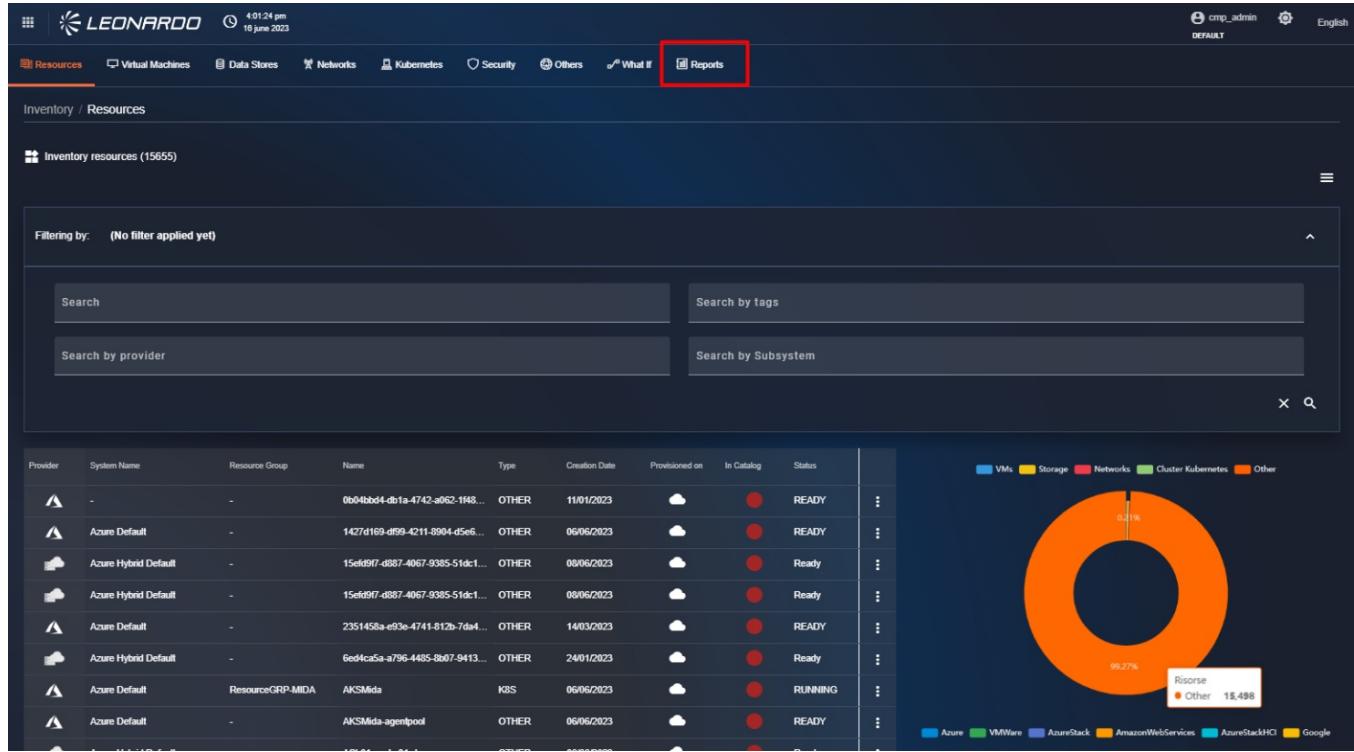


Figura 325 – Access to Catalog report

Available report types

- **Cost Summary** – Summary of total cost per service, based on the selected filter combination.
- **Cost Summary – Group by Resource Type** – Summary of total cost per service, with an indication of the number of resources involved, based on the selected filter combination.
- Cost Details – Detail of daily regional cost per resource, based on the selected filter combination.
- **Cost Details – Group by Resource Type** – Detail of total daily cost per service, with an indication of the number of resources involved, based on the selected filter combination.
- **FinOps Report** – Summary of total costs and total resource usage according to the FinOps FOCUS standard, for financial optimization of cloud services, based on the selected filter combination.

Creating a report

In the upper right of the page, we can click on the "New Report" button to start creating a report. Specifically, a modal window appears containing the list of available report types.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, Reports (which is currently selected), and a plus sign for New report. Below the navigation is a breadcrumb path: Inventory / Reports. The main area displays a table of reports categorized as Ready or Scheduled. One specific report entry for 'Inventory Summary' is highlighted. A modal window titled 'New report' is overlaid on the page, asking the user to 'Select a report type from the list'. Inside the modal, 'Inventory Summary' is listed with a description: 'Report about the number of resources related to specific filters'. At the bottom of the modal are 'Cancel' and 'Configure' buttons.

Figura 326 – New report creation

Once the report type is selected, click on the “Configure” button to select the providers to include in the report. In the newly opened window, you will find the “Provider” field, which allows you to select one or more pre-existing providers in the system. Subsequently, it is possible to select one or more subsystems to include in the report; if no providers are selected, no subsystem can be selected. Finally, there is a “tag” section to include only resources that have the entered tag.



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Secure Cloud Management Platform

The screenshot shows a dark-themed web interface for the Leonardo Secure Cloud Management Platform. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is currently selected. Below the navigation is a sub-menu for 'Inventory / Reports'. A modal dialog box titled 'Reports' is open in the center. It contains fields for 'Provider' (set to 'Azure, Google'), 'Subsystem' (set to 'MAE LAB, CMPPROJECT-374610'), and 'Tags'. There's also a section for 'Report Type' with radio buttons for 'One-Shot' (selected) and 'Recurring'. A red 'Submit' button is at the bottom of the modal. In the background, there's a table listing various reports with columns for 'Status' (all listed as 'READY') and 'Actions' (represented by three vertical dots). The table includes rows for different providers like AZURE, GOOGLE, OPENSHIFT and subsystems like MAE LAB.

Figura 327 – Report configuration

At this point, the user can choose between two different actions:

- Create a static report that will be saved in the system.
- Schedule a job that generates the report periodically.

To confirm the creation of a static report, verify that "One-Shot" has been selected for the "Report type" field and click the "Submit" button at the bottom.

After a loading period, the newly generated report will be visible in the list.



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Sub Category	Provider	Creation Date	Status	Actions
SUMMARY	AZURE, GOOGLE	12/06/2024 - 1:21 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:29 PM	READY	⋮
SUMMARY	AZURE	12/06/2024 - 12:28 PM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:05 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 10:01 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:32 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 8:20 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	10/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	07/06/2024 - 12:30 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	06/06/2024 - 12:29 AM	READY	⋮
SUMMARY	AZURE, GOOGLE, OPENSHIFT	05/06/2024 - 12:29 AM	READY	⋮
SUMMARY		04/06/2024 - 12:29 AM	READY	⋮

Figura 328 – List of generated reports

REPORT SCHEDULING

If, instead, you want to schedule automatic report execution, you will need to select “Recurring” for the “Report Type” field. In this case, the window updates to show additional parameters for configuring the periodic report.

The parameters to enter are:

- Period: allows selecting the report sending frequency (hourly, daily, ...).
- “Receive only if not empty” if selected, the file will not be sent when no information is present inside
- Report Language: allows selecting the language used in the report.
- File format: allows selecting one or more file types to include in the email.
- User E-mails: allows entering an email address to send reports to. After entering an email, it is necessary to press “Enter” on the keyboard to confirm its insertion. Once pressed, the newly entered email will move to the bottom box, and the field will be cleared to allow the insertion, if necessary, of a new email.



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The screenshot shows the 'Costs' report configuration dialog. It includes fields for 'Report Type' (One-Shot or Recurring), 'Period' (e.g., 'Last 7 days'), 'Report's language' (e.g., 'English'), 'File format' (e.g., 'CSV'), and 'User E-mails' (e.g., 'FinOps Report'). A note at the bottom says 'Press ENTER for each email you want to confirm and add to the list of recipients. It's possible to add multiple emails.' Below the dialog, a table lists scheduled reports with columns for 'Status' (READY) and 'Actions' (three dots).

	Status	Actions
1	READY	...
2	READY	...
3	READY	...
4	READY	...
5	READY	...
6	READY	...
7	READY	...
8	READY	...
9	READY	...
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Figura 330 – List of generated reports

LIST OF SCHEDULED REPORTS

To view the list of scheduled reports, select the “Scheduled” tab located at the top left of the reports page.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with various links like Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is underlined in orange. Below the navigation, there's a sub-menu for Inventory / Reports. On the right, there's a large title 'Reports' with a 'New report' button. Underneath, there's a table with columns: Period, Language, Recipients, Last sent, and Actions. The first row shows 'Hourly', 'EN', 'noame@gmail.com', and '12/06/2024 - 1:21 PM'. To the right of the table, there are pagination controls for 'Items per page' (set to 20), '1 - 1 of 1', and navigation arrows. A red box highlights the 'Scheduled' tab in the sub-menu, and a red arrow points to it from the left.

Figura 331 – List of scheduled reports

On this page, you will find the list and related information of the scheduled reports present in the system. For each result, by clicking the “Three dots” button on the right, three operations can be performed:

- View the last generated report.
- Edit the schedule settings; it will not be possible to modify the selected providers or subsystems.
- Delete the schedule to stop sending emails.



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Figura 332 – Editing a schedule

REPORT USAGE

By clicking on the row of a static report, or using the "Show report" button available for scheduled reports, you will be able to view the detail page of the selected report.

Within the Inventory report summary, there is a "Stats" section which includes the number of disks, interfaces, networks, and virtual machines belonging to the selected provider.

Below the "Stats" section, there are the filters used by the user to generate the report.

Below the filters, there is a summary table of resources belonging to the providers. On the right, there are two buttons: "PRINT" and "EXPORT".

Clicking the "PRINT" button brings up a print preview modal. To print the report, click the "Stampa" (Print) button in the lower right; at this point, the printing of the aforementioned will start.

Clicking the "EXPORT" button allows exporting the report in ".csv", ".json" or ".pdf" format.

To return to the "Results" tab, click the "CLOSE" button in the lower right, or click the left-pointing arrow in the upper left, next to the report title.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with links for Resources, Virtual Machines, Data Stores, Networks, Clusters, Security, Others, What If, and Reports. The Reports link is underlined, indicating it's the active section. Below the navigation is a breadcrumb trail: Inventory / Reports / Report 6669a0d3aae316468b3c8b34. The main content area is titled "Report Inventory Summary". It features a "Stats" section with five boxes: VMs (1), Disks (1), Networks (1), Interfaces (0), and K8Ss (0). Below this is a table titled "PROVIDER: AZURE, GOOGLE | SUBSYSTEM: MAE LAB,CMPPROJECT-374610". The table has columns for Type Provider, Subsystem Name, VMs, Disks, Networks, Interfaces, and K8Ss. It lists two entries: Azure (MAE LAB) with 14 VMs, 16 Disks, 14 Networks, 0 Interfaces, and 0 K8Ss; and Google (CMPPROJECT-374610) with 1 VM, 1 Disk, 1 Network, 0 Interfaces, and 0 K8Ss. At the bottom right of the table are buttons for "PRINT" and "EXPORT".

Type Provider	Subsystem Name	VMs	Disks	Networks	Interfaces	K8Ss
Azure	MAE LAB	14	16	14	0	0
Google	CMPPROJECT-374610	1	1	1	0	0

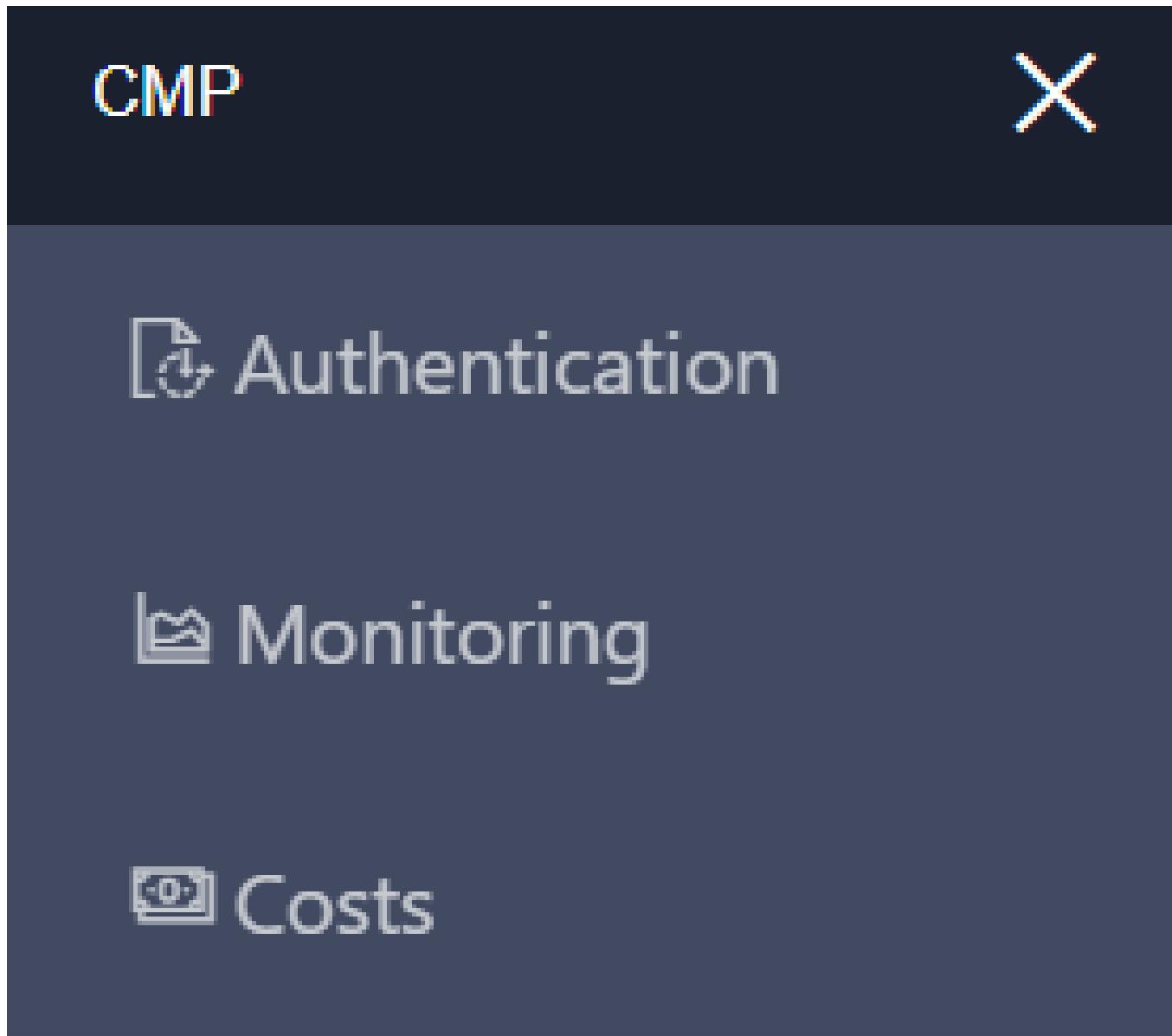
Figura 333 – Report details

11 Provisioning

Provisioning is one of the most important functionalities of SCMP. Through these modules, it is possible to allocate runtime assets within the providers managed by SCMP.

To use this functionality, relations must be defined within the SCMP.

This constraint was made available to bind certain characteristics to provisioning; for example, the VM size is not selectable during provisioning but is among the predefined characteristics by administrators within the catalog.



 **Inventory**

 **Security**

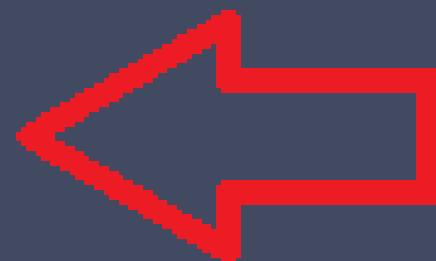
 **Dashboard**

 **Catalog**

 **Administration**

Cloud Maturity Model

♀ Provisioning



⌚ Log and Audit

⚠ Tool Risk

📋 Compliance



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Figura 334 – Access to "Provisioning"

11.0.1 Dashboard

Accessing the functionality, the first available page is the Dashboard of provisionings carried out within the system.

The page presents a series of graphs, filters, and the list of provisionings performed.

The graphs allow visualizing the information present in the table, grouped by:

- The total of all provisionings carried out, divided by type.
- The status of provisionings carried out, divided by outcome and category of the provisioned asset.

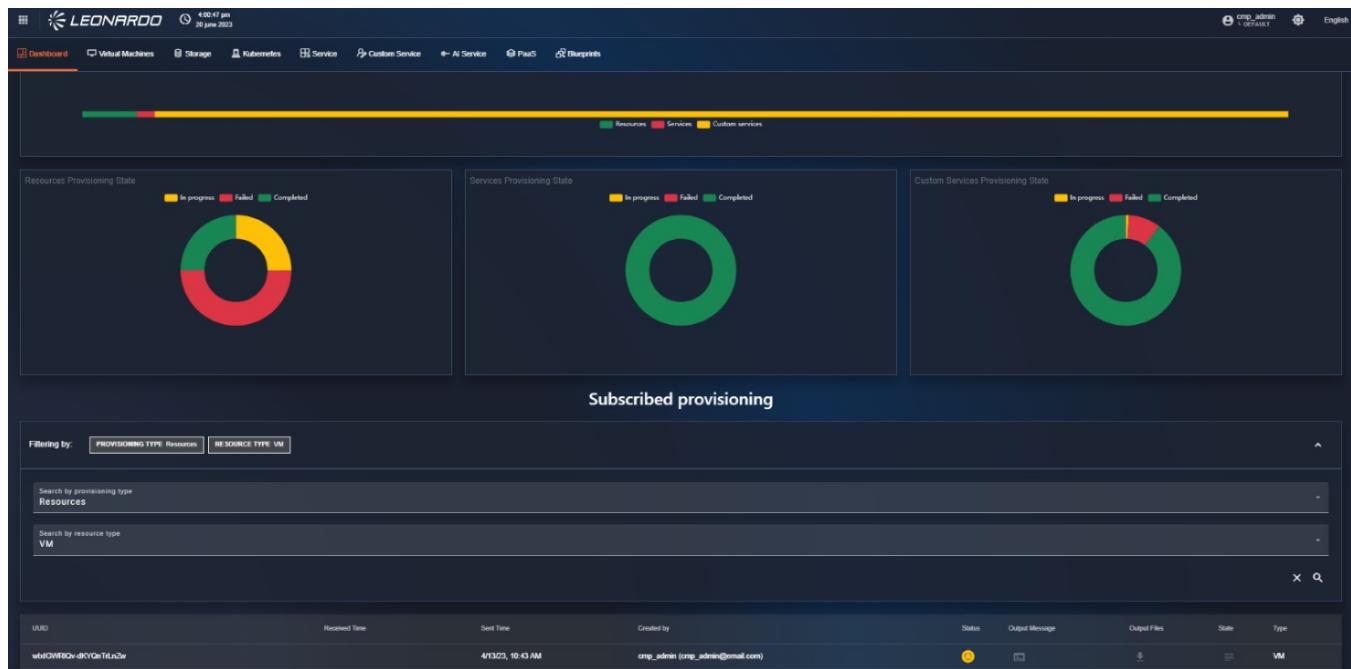
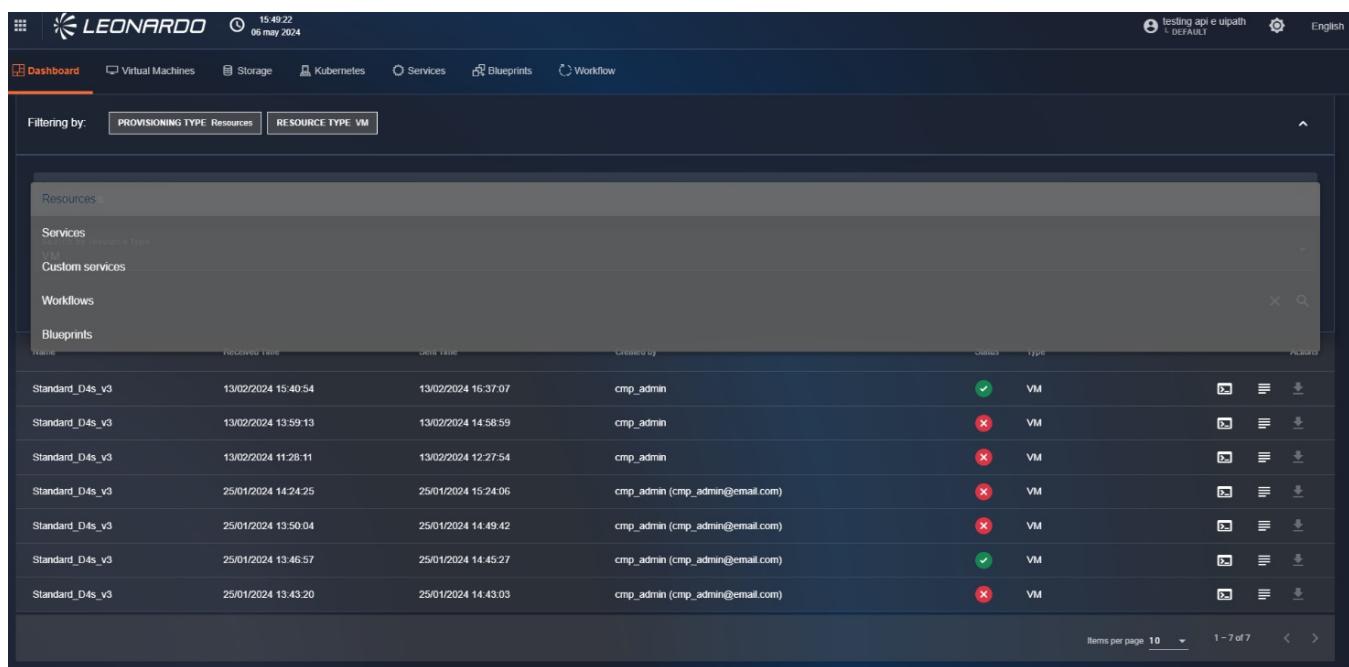


Figura 335 – Provisioning page graphs

At the bottom of the page, we can use the filters section to modify the results present in the table. The "Provisioning Type" filter is the main filter that allows selecting the type of asset to display, specifically:

- Selecting "Resources" adds a filter that allows selecting the type of resource for which you want to display the provisioning status. By default, the system shows the list of provisioned VMs.
- Selecting "Services" and "Custom services" has no additional filters, and the list is updated with only provisionings related to Services.
- Selecting "Blueprint" adds a filter that allows changing the flow (i.e., the type of blueprint to display), and the table is modified to show only flows not yet completed. Above the table, there is a control that allows changing tabs, to switch from "in progress" flows to "Completed" flows.



The screenshot shows a web-based interface for managing cloud resources. At the top, there's a header bar with the Leonardo logo, the date (06 may 2024), and some navigation links like Dashboard, Virtual Machines, Storage, Kubernetes, Services, Blueprints, and Workflow. Below the header, there's a filtering section with dropdowns for 'PROVISIONING TYPE' set to 'Resources' and 'RESOURCE TYPE' set to 'VM'. The main area is titled 'Resources' and contains a table with the following columns: Name, Received time, Sent time, Created by, Status, Type, and Actions. The table lists several entries, mostly 'Standard_D4s_v3' instances, with their creation dates ranging from 13/02/2024 to 25/01/2024. Some rows have green checkmarks in the 'Status' column, while others have red X's. The 'Actions' column contains icons for each row. At the bottom right of the table, there are pagination controls for 'Items per page' (set to 10) and '1 - 7 of 7'.

Figura 336 – Filter by asset type

11.0.2 Provisioning Table Specifications

11.0.2.1 "Resources", "Services", "Custom Services"

The list has the following attributes when "Resources", "Services", "Custom Services" is selected as a filter:

- Uuid, Provisioning identifier;
- Provisioning completion date;
- Provisioning request date;
- User who created the instance;
- Status;



- Output of provisioning systems;
- Detailed provisioning Json;
- Status information;
- Resource type.

UUID	Received Time	Sent Time	Created by	Status	Output Message	Output Files	State	Type
wxtGWRtQv-dkYQnTrLnZw	4/13/23, 10:43 AM		cmp_admin (cmp_admin@email.com)	?	Download	Download	Graph	VM
PbxnPXXNS0m8nKq3h7lp-A	3/10/23, 11:13 AM	3/10/23, 11:13 AM	cmp_admin (cmp_admin@email.com)	✓	Download	Download	Graph	VM
5zcav6HITBSMTk9zxh7BEg	1/30/23, 12:03 PM	1/30/23, 12:03 PM	cmp_admin (cmp_admin@email.com)	✗	Download	Download	Graph	VM
G_MjB0RyGYnSL02PzYcg	1/30/23, 12:01 PM	1/30/23, 12:00 PM	cmp_admin (cmp_admin@email.com)	✗	Download	Download	Graph	VM
pc_1NFOQmuZl6WWQpnbXA	1/30/23, 11:33 AM	1/30/23, 11:33 AM	cmp_admin (cmp_admin@email.com)	✗	Download	Download	Graph	VM
T8Fgg466Rzy5smb6Af9maw	1/12/23, 9:30 AM	1/12/23, 9:29 AM	cmp_admin (cmp_admin@email.com)	✗	Download	Download	Graph	VM
pQqRnCqERBacWb1PgYHq7Q			cmp_admin (cmp_admin@email.com)	?	Download	Download	Graph	VM

Figura 337 – “Resources” Table

When in this view, the following operations can be performed:

- By clicking on the row of a failed provisioning, it is possible to modify and re-execute it.
- By clicking on the "Output Message" icon corresponding to a provisioning, it is possible to view the response received from the "Terraform" module.
- By clicking the "Download" button, it is possible to download the files returned by the functionality.
- By clicking the "State" button, it is possible to view the graph and the list of provisioned resources.



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The screenshot shows the 'Subscribed provisioning' section of the Leonardo platform. It lists two entries:

- wxGWRQv-dKYQnTlnzW: Received Time 4/13/23, 10:43 AM, Created by cmp_admin (cmp_admin@email.com), Status yellow, Output Message, Output Files, State, Type VM.
- PtxhPXNNSm8nKq3H7lp-A: Received Time 3/10/23, 11:13 AM, Created by cmp_admin (cmp_admin@email.com), Status green, Output Message, Output Files, State, Type VM.

A modal window for the second entry shows the Terraform plan:

```

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:

# vsphere_virtual_machine.VMarePro2023 will be created
+ resource "vsphere_virtual_machine" "VMarePro2023" {
    + annotation
        = (known after apply)
    + boot_retry_delay
        = 10000
    + change_version
        = (known after apply)
    + cpu_limit
        = -1
    + cpu_share_count
        = (known after apply)
    + cpu_share_level
        = "normal"
    + datastore_id
        = "datastore-3011"
    + default_ip_address
        = (known after apply)
}
  
```

Figura 338 – Terraform message visualization

The screenshot shows the 'Subscribed provisioning' section of the Leonardo platform. It lists the same two provisioning entries as Figura 338.

A modal window for the second entry shows the Terraform plan and a resource graph visualization:

```

Lineage : eb622424-d4af-d79e-69a5-a23a050cadff
Resources 0
Resources 1
Resources 2
Resources 3
Serial : 1
Terraform Version : 1.1.9
Version : 4
  
```

The graph visualization shows nodes for VMarePro2023, datastore, network, and datacenter, connected by dashed arrows labeled 'Provisioning'.

Figura 339 – Resource graph visualization



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11.0.2.2 Auto uninstall of HELM services

When we select "Custom services" as a filter type, we can notice a new "Uninstall" button displayed with a "Stop" icon.

Name	Received Time	Sent Time	Created by	Status	Engine	Actions
Audio Analytics	04/06/2025 16:32:27	04/06/2025 16:32:22	cmp_api_test (giammarco.piccoliext2@leonardocompany.com)	✓		[View] [Edit] [Delete] [Uninstall]
Audio Analytics	30/05/2025 11:28:38	30/05/2025 11:23:46	cmp_admin	■		[View] [Edit] [Delete] [Uninstall (only Helm copies)]
Nginx Helm chart	30/05/2025 10:46:36	30/05/2025 10:43:41	cmp_api_test (giammarco.piccoliext2@leonardocompany.com)	■		[View] [Edit] [Delete] [Uninstall]
Audio Analytics	30/05/2025 10:00:28	30/05/2025 09:59:51	cmp_admin	■		[View] [Edit] [Delete] [Uninstall]
Audio Analytics	30/05/2025 09:56:43	30/05/2025 09:56:07	cmp_admin	■		[View] [Edit] [Delete] [Uninstall]
Audio Analytics	30/05/2025 09:55:39	30/05/2025 09:55:36	cmp_admin	✗		[View] [Edit] [Delete] [Uninstall]
Nginx Helm chart	30/05/2025 09:54:55	30/05/2025 09:54:40	cmp_admin	✗		[View] [Edit] [Delete] [Uninstall]
Audio Analytics	29/05/2025 14:37:01	29/05/2025 14:34:10	cmp_admin	■		[View] [Edit] [Delete] [Uninstall]

Figura 340 – Uninstall HELM service

Clicking the button will ask for confirmation of deletion. Upon confirmation, SCMP will delete all HELM resources deployed in the indicated namespace.



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Name	Received Time	Sent Time	Created by	Status	Engine	Actions
Audio Analytics	04/06/2025 16:32:27	04/06/2025 16:32:22	cmp_api_test (giammarco.piccoli.ext2@leonardocompany.com)	✓	helm	[Actions]
Audio Analytics	30/05/2025 11:28:38	30/05/2025 11:23:46	cmp_admin	✗	helm	[Actions]
Nginx Helm chart	30/05/2025 10:46:36	30/05/2025 10:43:41	cmp_api_test (giammarco.piccoli.ext2@leonardocompany.com)	✗	helm	[Actions]
Audio Analytics	30/05/2025 10:00:28	30/05/2025 09:59:51	cmp_admin	✗	helm	[Actions]
Audio Analytics	30/05/2025 09:56:43	30/05/2025 09:56:07	cmp_admin	✗	helm	[Actions]
Audio Analytics	30/05/2025 09:55:39	30/05/2025 09:55:36	cmp_admin	✗	helm	[Actions]
Nginx Helm chart	30/05/2025 09:54:55	30/05/2025 09:54:40	cmp_admin	✗	helm	[Actions]
Audio Analytics	29/05/2025 14:37:01	29/05/2025 14:34:10	cmp_admin	✗	helm	[Actions]

Figura 341 – Uninstall confirmation

11.0.2.3 Blueprint

The list has the following attributes when "Blueprint" is selected as a filter:

- Blueprint Name
- Creation Date
- User who provisioned the blueprint

Above the table, we can notice two tabs. By clicking on them, the table is filtered respectively for Blueprints to be completed and Completed Blueprints (in red in the image).



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The screenshot shows a web interface for managing cloud resources. At the top, there's a navigation bar with tabs for Dashboard, Virtual Machines, Storage, Kubernetes, Services, Blueprints (which is currently selected), and Workflow. The main title is "Subscribed provisioning". Below the title, there's a filtering section with a dropdown set to "Blueprints". A search bar contains the text "Blueprints". There are two tabs at the top of a table: "To be completed" (highlighted with a red arrow) and "Completed/Failed" (highlighted with a red box). The table lists three blueprint entries:

Name	Creation date	Created by
Docker development environment	18/03/2024 09:46:30	cmp_admin
Docker development environment	14/03/2024 09:29:13	cmp_admin
Only manual	14/03/2024 09:12:56	cmp_admin

*Figura 342 – “Provisioning blueprint”
table tabs*

In this view, it is possible to click on a table row to view the blueprint details.

When the selected blueprint is "to be completed," we will be redirected to the blueprint provisioning page where we can perform the necessary operations for completion.



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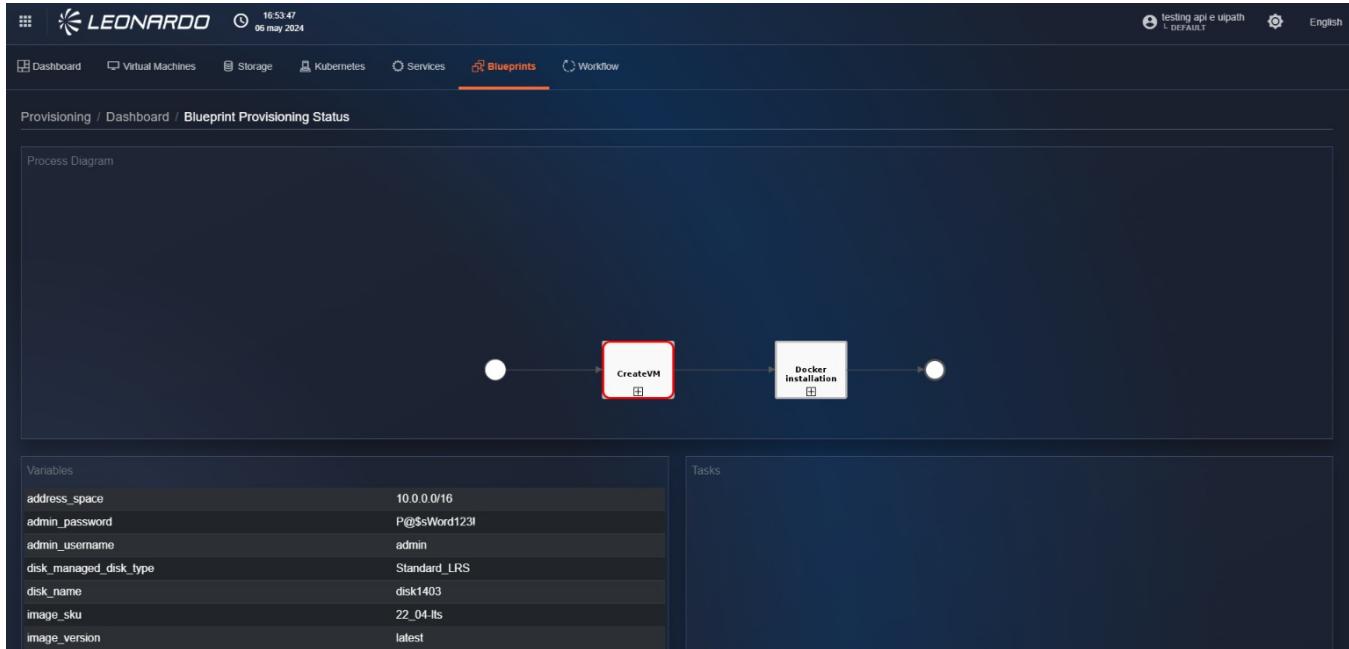


Figura 343 – “To be completed” flow visualization

If a completed blueprint is selected instead, we will be redirected to the blueprint provisioning details page where the prediction "flow" will not be displayed because it has already been completed.

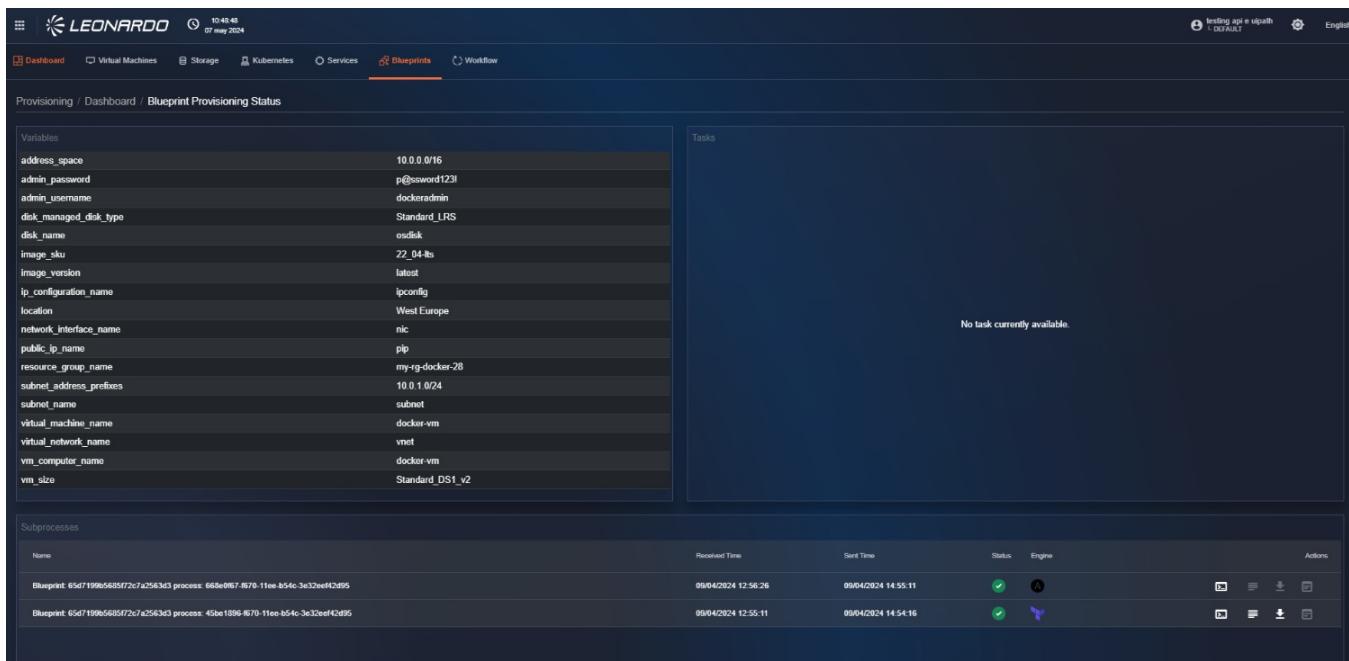


Figura 344 – “Completed” flow visualization

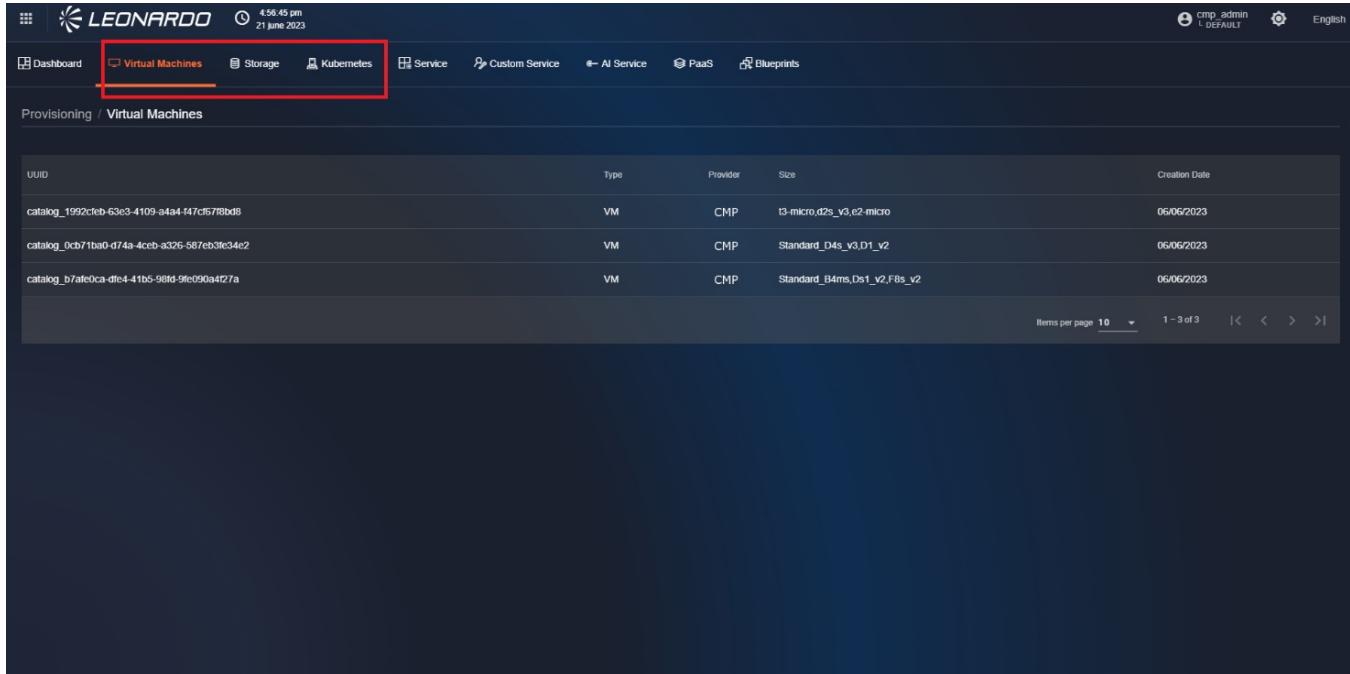
11.0.3 Creation of Provisionings

11.0.3.1 Provisioning of "Physical Resources"

Using the tabs in the provisioning functionality, it is possible to view the lists of provisionable resources within the SCMP, such as Virtual Machines, Storage, and Kubernetes.

To view elements within the result lists, it is necessary that a relation exists in the SCMP catalog with the catalog resource of the provider to be provisioned.

The functionalities available for these elements are identical; only the parameters to be entered in the creation steps change.



The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there is a header with the Leonardo logo, the date and time (4:56:45 pm, 21 June 2023), and user information (cmp_admin, L DEFAULT, English). Below the header is a navigation bar with several tabs: Dashboard, Virtual Machines (which is highlighted with a red box), Storage, Kubernetes, Service, Custom Service, AI Service, PaaS, and Blueprints. The main content area is titled 'Provisioning / Virtual Machines'. It displays a table of virtual machines with columns for UUID, Type, Provider, Size, and Creation Date. There are three entries in the table:

UUID	Type	Provider	Size	Creation Date
catalog_1992cfe8-63e3-4109-a4a4-147cf57f8bd8	VM	CMP	t3-micro,d2s_v3,e2-micro	06/06/2023
catalog_0cb71ba0-d74a-4ceb-a326-587eb3fe34e2	VM	CMP	Standard_D4s_v3.01_v2	06/06/2023
catalog_b7afe0ca-dfe4-41b5-98fd-9fe090a4d27a	VM	CMP	Standard_B4ms,Ds1_v2,F8s_v2	06/06/2023

At the bottom right of the table, there are pagination controls: 'Items per page' set to 10, and page indicators showing '1 - 3 of 3' with arrows for navigation.

Figura 345 – Tabs for resource creation

11.0.3.1.1 VIRTUAL MACHINES



To start provisioning a resource, click on the corresponding row to view the page containing step 1 of provisioning creation. In this step, it is necessary to select, using the dropdown on the left, the "target" subsystem where the resources are to be provisioned. Once selected, an information mirror will be displayed on the right indicating the characteristics of the resource that will be provisioned. To continue, click the "Next" button at the bottom right to go to step 2 "Config" page.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a header with the Leonardo logo, the date (07 may 2024), and time (11:20:33). Below the header, a navigation bar includes links for Dashboard, Virtual Machines (which is highlighted in red), Storage, Kubernetes, Services, Blueprints, and Workflow. The main content area is titled 'Provisioning / Virtual Machines / 6620d77dc532870f91e5ed34 / Add'. A progress bar at the top indicates Step 1: Subsystem. The 'Subsystem' dropdown is set to 'CONSIP Management'. To the right, a summary box displays the selected configuration: 'Standard_B8ms (Azure)', 'Total CPU: 8', 'Name: Standard_B8ms', 'Total RAM: 32 GB', and 'Size: B8ms'. Below the summary box are buttons for 'Config', 'System Type', 'CMP', 'Description' (with the value 'Virtual Machine del Catalogo'), and 'Next'. There's also a 'Reset' button on the far left.

Figura 346 – Selection of the “target” subsystem, provisioning step 1

On the "Config" page of step 2, fill in all mandatory fields in all sections of the form. At the bottom left, click the "Reset" button to reset all fields on the page.

Instead, on the right, click the "Submit" button to go to step 3 "Plan".



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The screenshot shows a web-based interface for provisioning a new virtual machine. At the top, there's a header with the Leonardo logo, the date and time (12:48:40 pm, 07 December 2022), and user navigation options like cmp, DEFAULT, and English. Below the header, the URL is shown as Provisioning / Virtual Machines / 62b97ff37f8ef770c55e208a / Add. The main area is titled "new virtual machine". It contains several sections: "Configuration Options" with fields for "Virtual Machine Name" (mandatory), "Resource Group" (mandatory), "Storage Type (Disk for OS)" (mandatory), "Storage Size (Disk for OS) GB" (set to 10), and "Image" (mandatory); a "Network" section with "Network" and "Subnet" dropdowns, and checkboxes for "Assign Public IP" and "Create new network"; and a "Tags" section. At the bottom left is a "Reset" button, and at the bottom right is a "Submit" button.

This screenshot shows a continuation of the configuration process. It features a "User name for access" field with a mandatory asterisk, a "Password" field, and a "Tags" field. A "Reset" button is on the left, and a "Submit" button is on the right. There's also a checkbox for "Add storage".

Figura 347 – Filling in the resource prediction form fields

After clicking the "Submit" button, the user is redirected to the "Plan" page of step 3 where we can view the provisioning plan sent by Terraform, which indicates all the parameters of the resources that will be configured, and at the bottom, there is a list with a cost perspective.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a header with the Leonardo logo, date (29 October 2022), time (5:57:25 pm), user (cmp_admin), and language (English). The main area has tabs for 'Subsystem' (selected), 'Config', and 'Plan'. The 'Plan' tab is active, displaying a Terraform execution plan. It shows a single resource: 'azurerm_linux_virtual_machine.vmtest' being created. The configuration includes parameters like admin_password, admin_username, allow_extension_operations, computer_name, disable_password_authentication, extensions_time_budget, id, location, and max_bid_price. Below the plan, a 'Costs' section lists consumption and reservation details. Consumption shows a cost of €0.15 for 1 hour. Reservations show costs of €0.06 for 3 years and €0.09 for 1 year. At the bottom right of the 'Plan' tab, there are 'Back', 'Reset', and 'Apply' buttons.

Figura 348 – Forecast screen

Still from the "Plan" page of step 3, at the bottom right, there are three buttons: "Back", "Reset", and "Apply". If you click the "Back" button, the user returns to the "Config" page of step 2 where parameters can be modified.

If you click the "Reset" button, the user is redirected to the "Subscription" page of step 1 where it is necessary to select a subsystem, and then enter the parameters on the "Config" page of step 2.

Finally, if you click the "Apply" button, the forecast is saved, and the user is redirected to the "Dashboard" tab page where the user verifies the presence of the newly created forecast.



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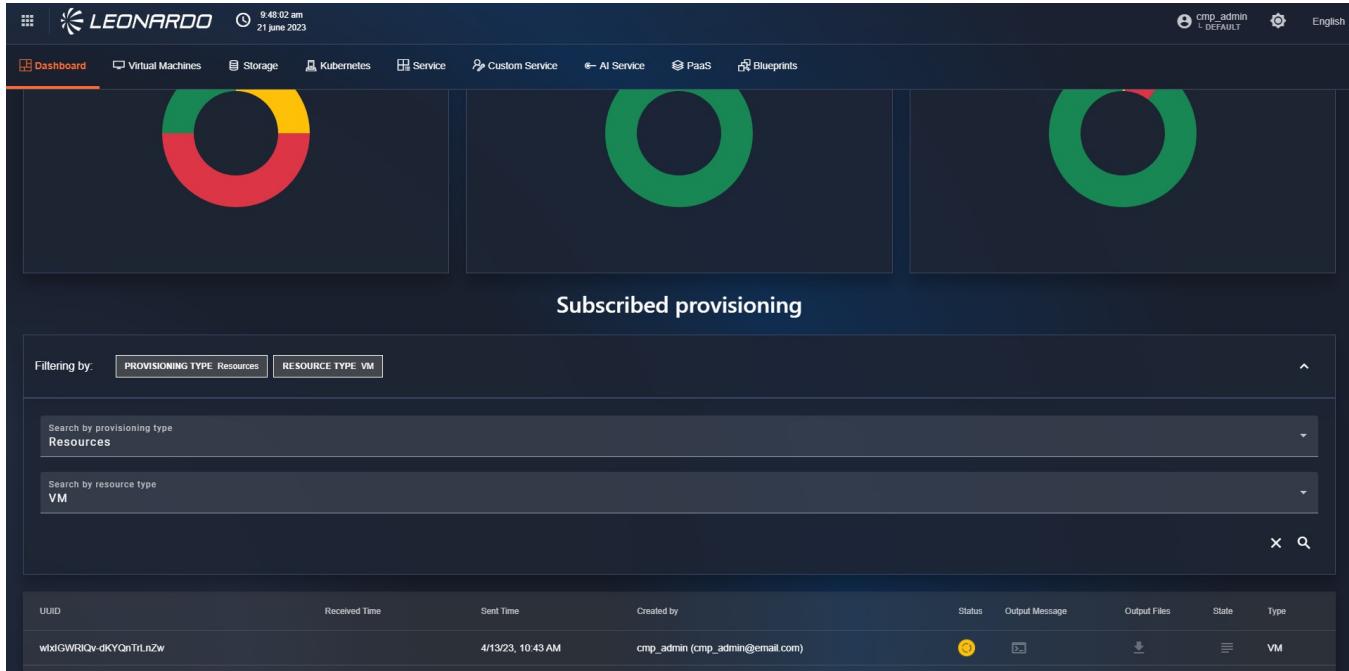


Figura 349 – List of provisioning performed

11.0.3.2 Provisioning of "Services"

To access the services page, click on the tab that depicts a shelf located in the top menu. After doing this, you will find yourself on the "Service" page.

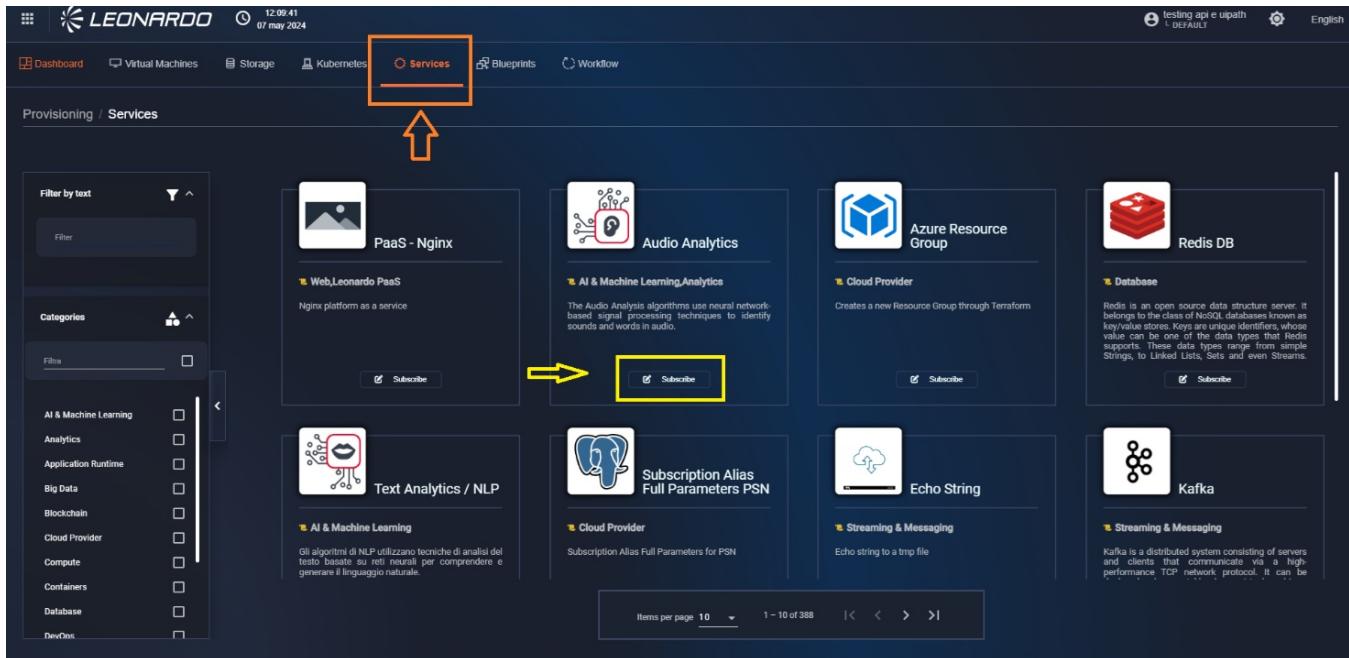


Figura 350 – List of cards

On the page, a list of components called "Card" is displayed. Each card refers to a specific type of service; in particular, the following information is displayed:

- Service name;
- Service icon;
- Type of script used for service provisioning;
- Service description;
- "Subscribe" button to proceed with service creation.

Depending on the type of service selected, the steps for provisioning change; these will be analyzed in detail below.

11.0.3.2.1 "STANDARD" SERVICES

Click the "Subscribe" button corresponding to a "standard" service. The user will be redirected to step 1 of the service creation page, and all instantiable versions of the service by SCMP will be displayed. In particular, various blocks will be shown, each with a list of configurations:

- Name and version of the service that will be instantiated.
- Name and version of the operating system that will be installed on the machine.
- Belonging provider on which the service will be provisioned.



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The screenshot shows a web-based interface for provisioning a Kafka service. At the top, there's a navigation bar with tabs: Dashboard, Virtual Machines, Storage, Kubernetes, Service (which is highlighted in orange), Custom Service, AI Service, PaaS, and Blueprints. On the far right, it shows 'cmp_admin' with a 'L DEFAULT' icon, a gear icon for settings, and 'English'. Below the navigation, the URL 'Provisioning / Service / Subscribe service' is visible. The main content area has three tabs at the top: '1 Configuration' (selected), '2 Details', and '3 Summary'. The 'Configuration' tab contains the heading 'Subscribe a Kafka' and a sub-instruction 'Select the customization you prefer from list:'. Underneath, there's a section titled 'Available options:' with two items listed:

- Redis DB 7.0** [redis] [redistb]
OS: ubuntu-20_04-lts | Version: 3.2.1 | Available on: Azure
Redis version 7.0 on Ubuntu 20.04 LTS
- Redis DB 7.0** [redis] [redistb]
OS: ubuntu-22_04-lts | Version: 3.2.1 | Available on: Azure
Redis version 7.0 on Ubuntu 22.04 LTS

Below these options, it says 'Option selected: (None)' and has a 'Continue' button on the right.

Figura 351 – Provisioning of a "standard" service

Select a software version and press the "Continue" button; the user is redirected to step 2 of service provisioning.

In step 2, it will be necessary to select a subsystem and fill out the form with the details of the chosen subsystem.

The screenshot shows the second step of the Kafka configuration process. The top navigation bar and tabs are identical to the previous screenshot. The main content area is titled 'Configuration Options' and contains several input fields:

- Account Name * (text input field)
- Resource Group * (dropdown menu)
- Location * (dropdown menu)
- Failover Location * (dropdown menu)
- Database Name * (text input field)
- Throughput (RU/s) (text input field, currently set to 400)
- Tags (text input field)

At the bottom left is a 'Reset' button, and at the bottom right is a 'Submit' button.

Figura 352 – Configuration of a



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"standard" service

After completing all the form fields, click "Submit".

A request will be sent to the Terraform service, which will validate the activation configuration of the indicated flow and return the result.

The screenshot displays a service configuration summary page. At the top, there's a navigation bar with links for Dashboard, Virtual Machines, Storage, Kubernetes, Service (which is highlighted in orange), Custom Service, AI Service, PaaS, and Blueprints. Below the navigation, the path 'Provisioning / Service / Subscribe service' is shown. The main content area is titled 'Configuration' and contains the following text:

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:

```
# azurerm_cosmosdb_account.account-name will be created
+ resource "azurerm_cosmosdb_account" "account-name" {
    + access_key_metadata_writes_enabled = true
    + analytical_storage_enabled = false
    + connection_strings = (sensitive value)
    + create_mode = (known after apply)
```

At the bottom right of the configuration panel, there are 'Back' and 'Apply' buttons. Above the configuration panel, there are 'Details' and 'Summary' tabs, with 'Summary' being the active tab.

Figura 353 – Service configuration summary

Click "Apply" to validate the flow and activate the service subscription.

The dashboard page will open with the list of all subscribed services and their relative statuses. Specifically, the newly provisioned service will have a "Running" status in yellow, and subsequently, depending on the result, the status will also be updated to "Completed" in green or "Error" in red.



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The screenshot shows a dark-themed dashboard with a header bar at the top. The header includes the Leonardo logo, the date and time (4:23:56 pm, 23 june 2023), user information (cmp_admin, L DEFAULT), and language selection (English). Below the header is a navigation bar with links: Dashboard, Virtual Machines, Storage, Kubernetes, Service, Custom Service, AI Service, PaaS, and Blueprints. The main content area has a title 'Filtering by: PROVISIONING TYPE Services'. A search bar below it says 'Search by provisioning type Services'. The main table lists four service entries:

UUID	Received Time	Sent Time	Created by	Status	Output Message	Output Files	State	Type
DSQblikPQuq0UVjDJRNQJQ	6/23/23, 12:23 PM	6/23/23, 12:22 PM	cmp_admin (cmp_admin@email.com)	X	☒	⬇	☰	SERVICE
VJwINV74QF23OS0pn9FJyA	4/13/23, 10:32 AM	4/13/23, 10:25 AM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM
YB6bDobKQxukQCP40VUa1g	1/30/23, 12:29 PM	1/30/23, 12:27 PM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM

Figura 354 – Dashboard with the list of all subscribed services and their relative statuses

11.0.3.2.2 "CUSTOM" SERVICES

Click the "Subscribe" button corresponding to a "custom" service. The user will be redirected to step 1 of the service creation page where the subsystem can be selected, in which to perform the provisioning, from the dropdown in the center of the page.

The screenshot shows a dark-themed configuration page for a custom service. At the top, there's a header with the Leonardo logo, the date and time (14:12:01, 07 may 2024), user information (testing api e ipath, L DEFAULT), and language selection (English). Below the header is a navigation bar with links: Dashboard, Virtual Machines, Storage, Kubernetes, Services, Blueprints, and Workflow. The main content area has a title 'Provisioning / Custom Services' and a sub-section 'Subscribe Custom Service'. It includes a 'Configuration' section with a 'Subsystem' dropdown menu. The dropdown menu is open, showing the option 'Subsystem'.



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Figura 355 – Provisioning of a “Custom” service

By selecting the subsystem, the page updates to proceed to step 2 of service provisioning.

In this step 2, it will be necessary to fill out the form with the specific configuration parameters of the selected service.

The screenshot shows a configuration interface for a "Custom Service". The top navigation bar includes links for Dashboard, Virtual Machines, Storage, Kubernetes, Service (which is highlighted), Custom Service, AI Service, PaaS, and Blueprints. The main section is titled "Configuration Options" and contains the following fields:

- Account Name * (input field)
- Resource Group * (input field)
- Location * (input field)
- Failover Location * (input field)
- Database Name * (input field)
- Throughput (RU/s) (input field, currently set to 400)
- Tags (input field)

At the bottom of the form are two buttons: "Reset" and "Submit".

Figura 356 – Configuration of a “custom” service

After completing all the form fields, click "Launch".

A request will be sent to the Terraform service, which will validate the activation configuration of the indicated flow and return the result.



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The screenshot shows the 'Service' configuration summary page. It displays the Terraform execution plan, which includes creating an Azure Cosmos DB account with specific settings like access key metadata writes enabled and analytical storage enabled. At the bottom, there are 'Back' and 'Apply' buttons.

Figura 357 – Service configuration summary

Click "Apply" to validate the flow and start the automatic configuration operations.

The dashboard page will open with the list of all subscribed services and their relative statuses.

Specifically, the newly provisioned service will have a "Running" status in yellow, and subsequently, depending on the result, the status will also be updated to "Completed" in green or "Error" in red.

UUID	Received Time	Sent Time	Created by	Status	Output Message	Output Files	State	Type
DSQblikPQuq0UVjDJRNQJQ	6/23/23, 12:23 PM	6/23/23, 12:22 PM	cmp_admin (cmp_admin@email.com)	✖	✉	⬇	✖	SERVICE
VJwINV74QF23OS0pn9FJyA	4/13/23, 10:32 AM	4/13/23, 10:25 AM	cmp_admin (cmp_admin@email.com)	✓	✉	⬇	✓	VM
YB6bDobKQxukQCP40VuA1g	1/30/23, 12:29 PM	1/30/23, 12:27 PM	cmp_admin (cmp_admin@email.com)	✓	✉	⬇	✓	VM

Figura 358 – Dashboard with the list of all subscribed services and their relative



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statuses

11.0.3.2.3 "AZURE PIPELINE" SERVICES

Click the "Subscribe" button corresponding to an "Azure Pipeline" service. The user will be redirected to step 1 of the service creation page. From the dropdown in the center of the page, select the "Branch" of the pipeline to execute.

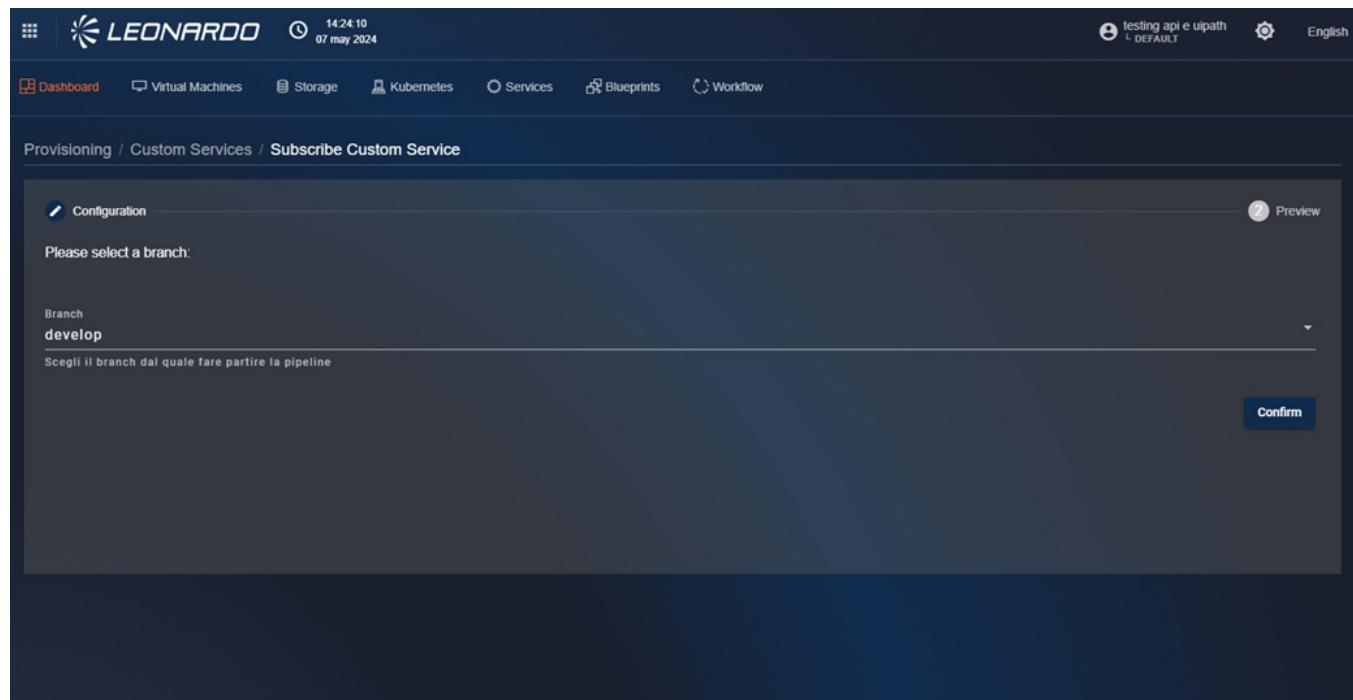


Figura 359 – Provisioning of an "Azure pipeline" service

By selecting the branch, the page updates to proceed to step 2 of service creation.

In this step 2, it will be necessary to fill out the form with the configuration parameters retrieved directly from the Pipeline that will be executed.



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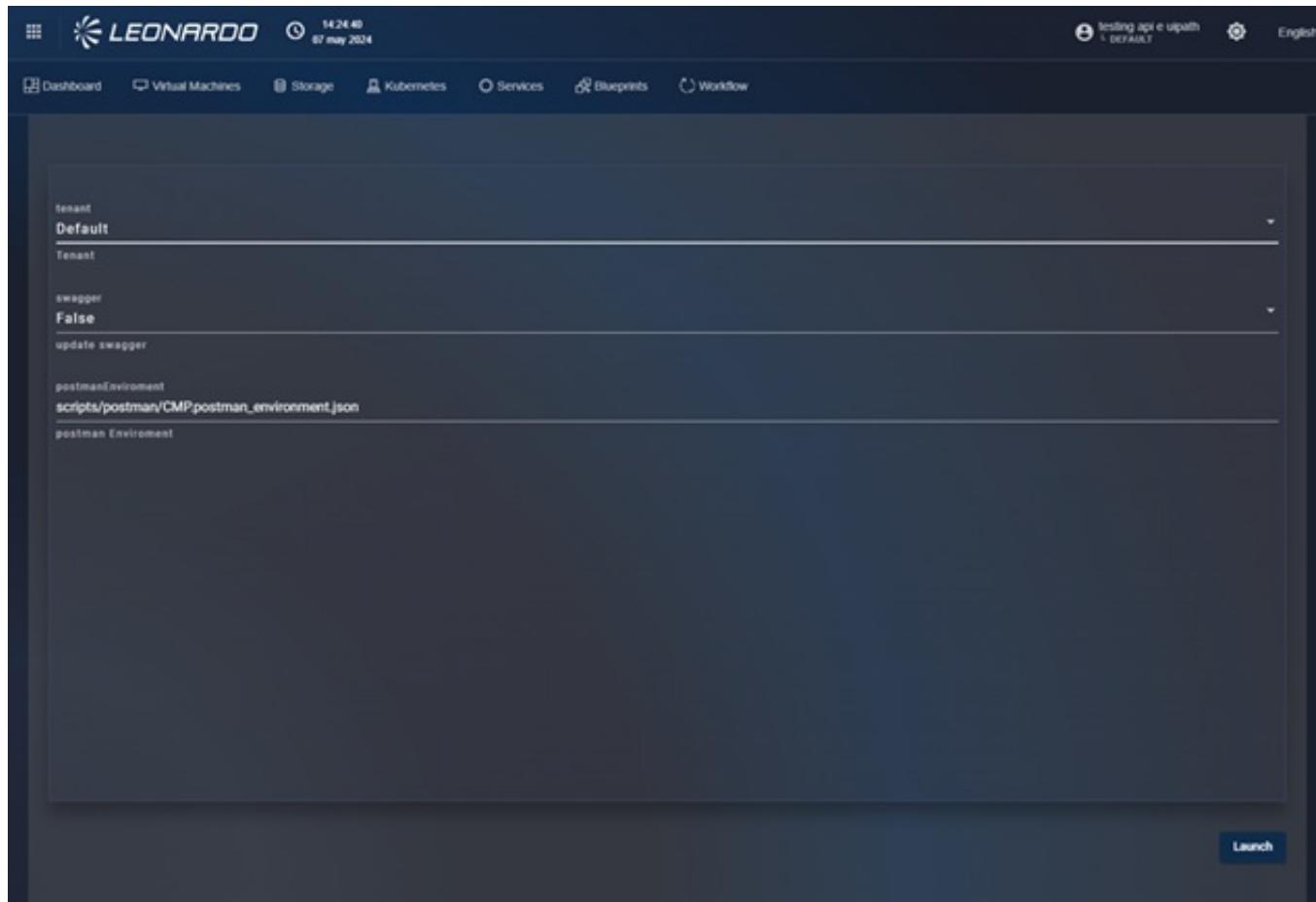


Figura 360 – Configuration of an "Azure pipeline" service

After completing all the form fields, click "Launch" to send the pipeline start request. The dashboard page will open with the list of all subscribed services and their relative statuses.

Specifically, the newly provisioned service will have a "Running" status in yellow, and subsequently, depending on the result, the status will also be updated to "Completed" in green or "Error" in red.



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The screenshot shows a dark-themed dashboard with a top navigation bar featuring the Leonardo logo, a timestamp (4:23:56 pm, 23 June 2023), user information (cmp_admin, L DEFAULT), and language selection (English). Below the navigation is a horizontal menu with links: Dashboard (highlighted in orange), Virtual Machines, Storage, Kubernetes, Service, Custom Service, AI Service, PaaS, and Blueprints. A search bar labeled 'Filtering by: PROVISIONING TYPE Services' is present. A dropdown menu titled 'Search by provisioning type' also lists 'Services'. The main content area displays a table of service subscriptions:

UUID	Received Time	Sent Time	Created by	Status	Output Message	Output Files	State	Type
DSQblikPQuq0UVjDJRNQJQ	6/23/23, 12:23 PM	6/23/23, 12:22 PM	cmp_admin (cmp_admin@email.com)	X	☒	⬇	☰	SERVICE
VJwINV74QF23OS0pn9FJyA	4/13/23, 10:32 AM	4/13/23, 10:25 AM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM
YB6bDobKQxukQCP40VUa1g	1/30/23, 12:29 PM	1/30/23, 12:27 PM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM

Figura 361 – Dashboard with the list of all subscribed services and their relative statuses

11.0.3.2.4 "PAAS" AND "AI SERVICES"

Click the "Subscribe" button corresponding to a "PaaS" service. The user will be redirected to step 1 of the service creation page where it will be necessary to fill out the form with the specific configuration parameters of the selected service.



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The screenshot shows a dark-themed web interface for provisioning a PaaS service. At the top, there's a header with the Leonardo logo, the date '07 may 2024', and a user profile. Below the header, a navigation bar includes links for Dashboard, Virtual Machines, Storage, Kubernetes, Services, Blueprints, and Workflow. The main content area shows a breadcrumb trail: Provisioning / PaaS Services / Subscribe PaaS Service. A step indicator '1 Configuration' is visible. The configuration form contains the following fields:

- method: POST (Http Method)
- endpoint: http://nuvolaris.apps.clu02.paas-psn.priv:80/api/v1/web/nuvolaris/workflow/wfm (Endpoint)
- REPLICAS: 1

Figura 362 – Configuration of a "PaaS" service

After completing all the form fields, click "Launch".

The dashboard page will open with the list of all subscribed services and their relative statuses.

Specifically, the newly provisioned service will have a "Running" status in yellow, and subsequently, depending on the result, the status will also be updated to "Completed" in green or "Error" in red.



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The screenshot shows a dark-themed dashboard with the Leonardo logo at the top. The top navigation bar includes links for Dashboard, Virtual Machines, Storage, Kubernetes, Service, Custom Service, AI Service, PaaS, and Blueprints. On the left, there's a sidebar with a 'Filtering by' dropdown set to 'PROVISIONING TYPE Services'. Below it is a search bar with 'Services' selected. The main area displays a table of service details:

UUID	Received Time	Sent Time	Created by	Status	Output Message	Output Files	State	Type
DSQblikPQuq0UVjDJRNQJQ	6/23/23, 12:23 PM	6/23/23, 12:22 PM	cmp_admin (cmp_admin@email.com)	X	☒	⬇️	☰	SERVICE
VJwINV74QF23OS0pn9FJyA	4/13/23, 10:32 AM	4/13/23, 10:25 AM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇️	☰	VM
YB6bDobKQxukQCP40VUa1g	1/30/23, 12:29 PM	1/30/23, 12:27 PM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇️	☰	VM

Figura 363 – Dashboard with the list of all subscribed services and their relative statuses

11.0.3.2.5 "HELM" SERVICES

Click the "Subscribe" button corresponding to a "HELM" service. The user will be redirected to step 1 of the service creation page where it will be necessary to select the cluster on which to perform the provisioning.

The screenshot shows a configuration page for subscribing a custom service. At the top, it says 'Provisioning / Services / Subscribe Custom Service'. Below that, there's a 'Configuration' section with a note: 'Please select the subsystem on which executing this operation:'. A dropdown menu for 'Subsystem' shows 'MAE CMP' selected. Further down, another dropdown menu for 'Cluster' is visible. The rest of the page is mostly blank or has very faint text.



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Figura 364 – Cluster selection

Fill out the form with the specific configuration parameters of the selected service. Also, add the "values.yaml" file at the bottom, which contains all the configuration parameters necessary for the service.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a header with the Leonardo logo, the date (15 novembre 2024), and a user icon. Below the header, a navigation bar includes links for Dashboard, Virtual Machines, Storage, Networking, Security, Kubernetes, Services (which is highlighted in orange), Blueprints, and Workflow. Under the Services section, a sub-menu shows 'Provisioning / Services / Subscribe Custom Service'. The main content area is titled 'Configuration' and shows a form for deploying a service to 'CMP-DEV3'. The form has sections for 'release' (Release Name) and 'namespace' (Release Namespace). At the bottom of the form, there's a large text input field with the placeholder 'Click here to upload a file'.

Figura 365 – Configuration of "HELM" parameters

After completing all the form fields, click "Launch".

The dashboard page will open with the list of all subscribed services and their relative statuses.

Specifically, the newly provisioned service will have a "Running" status in yellow, and subsequently, depending on the result, the status will also be updated to "Completed" in green or "Error" in red.



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The screenshot shows a dark-themed dashboard with a top navigation bar featuring the Leonardo logo, time (4:23:56 pm, 23 June 2023), user (cmp_admin), and language (English). Below the navigation is a horizontal menu with links: Dashboard (highlighted in orange), Virtual Machines, Storage, Kubernetes, Service, Custom Service, AI Service, PaaS, and Blueprints. A search bar below the menu allows filtering by provisioning type, with 'Services' selected. The main content area displays a table of subscribed services with columns: UUID, Received Time, Sent Time, Created by, Status, Output Message, Output Files, State, and Type. The table contains three rows:

UUID	Received Time	Sent Time	Created by	Status	Output Message	Output Files	State	Type
DSQblikPQuq0UVjDJRNQJQ	6/23/23, 12:23 PM	6/23/23, 12:22 PM	cmp_admin (cmp_admin@email.com)	X	☒	⬇	☰	SERVICE
VJwINV74QF23OS0pn9FJyA	4/13/23, 10:32 AM	4/13/23, 10:25 AM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM
YB6bDobKQxukQCP40VUa1g	1/30/23, 12:29 PM	1/30/23, 12:27 PM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM

Figura 366 – Dashboard with the list of all subscribed services and their relative statuses

11.0.3.2.6 "IMMUTABLE" HELM SERVICES

If the "immutable" flag was selected for the HELM service during creation, the user is not given the option to view and modify the service information, thus allowing for a "one-Click" installation. Once "subscribe" is selected, the system automatically begins provisioning and returns the user to the dashboard page to monitor the results.

This screenshot is identical to Figura 366, showing the same dashboard layout and service list. The table of subscribed services is as follows:

UUID	Received Time	Sent Time	Created by	Status	Output Message	Output Files	State	Type
DSQblikPQuq0UVjDJRNQJQ	6/23/23, 12:23 PM	6/23/23, 12:22 PM	cmp_admin (cmp_admin@email.com)	X	☒	⬇	☰	SERVICE
VJwINV74QF23OS0pn9FJyA	4/13/23, 10:32 AM	4/13/23, 10:25 AM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM
YB6bDobKQxukQCP40VUa1g	1/30/23, 12:29 PM	1/30/23, 12:27 PM	cmp_admin (cmp_admin@email.com)	✓	☒	⬇	☰	VM

Figura 367 – Dashboard with the list of all subscribed services and their relative

statuses

11.0.3.3 Provisioning of "Edge" device images

To access the "Edge" provisioning page, click on the tab of the same name in the top menu.

After doing this, we will be taken to the "Edge" page of the provisioning module.

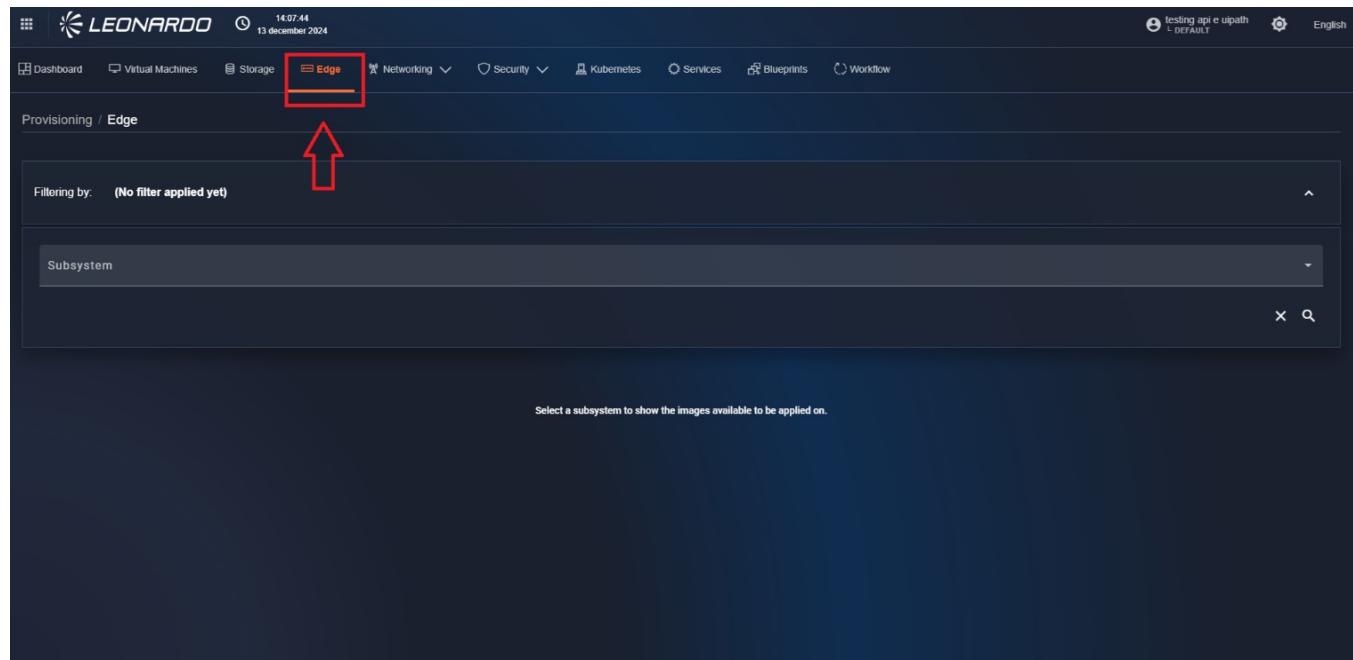


Figura 368 – Access to Edge provisioning

At first glance, the page may appear empty, but by selecting a configured EDGE subsystem from the "Subsystem" filter, all available images in the subsystem will be displayed below.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. The top navigation bar includes links for Dashboard, Virtual Machines, Storage, Edge (which is highlighted in red), Networking, Security, Kubernetes, Services, Blueprints, and Workflow. The timestamp in the top right corner is 09:38:40, 16 December 2024. The user is logged in as cmp_admin with a default role. The language is set to English. The main content area is titled 'Provisioning / Edge'. A filtering bar at the top left says 'Filtering by: SUBSYSTEM EdgeRHEL'. Below it, a dropdown menu shows 'Subsystem' and 'EdgeRHEL'. On the left, a sidebar lists 'Available Images' with several options: -EdgeMonitoring_v1, -Test_v1, -pensaEdgeTest01_v1, -thinkedge_v1, rhel9/x86_64/edge-EdgeMonitoring_v2, rhel9/x86_64/edge-pensaEdgeTest01_v10, and rhel9/x86_64/edge-pensaEdgeTest01_v11.

Figura 369 – Images available in the system

By selecting one of the available images, a section will open on the right that allows selecting a compatible inventory machine from the list.

After selecting a machine, we can confirm the operation using the "Apply" button.

We will be returned to the "dashboard" section of the "Provisioning" module where we can view the outcome of the operations.



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The screenshot shows the Leonardo Secure Cloud Management Platform's Edge provisioning interface. At the top, there's a navigation bar with tabs for Dashboard, Virtual Machines, Storage, Edge (which is active), Networking, Security, Kubernetes, Services, Blueprints, and Workflow. Below the navigation is a breadcrumb trail: Provisioning / Edge. A filtering bar shows 'SUBSYSTEM EdgeRHEL'. The main area is titled 'Available Images' and lists several RHEL images: rhel/9/x86_64/edge-pensaEdgeTest01_v2, rhel/9/x86_64/edge-pensaEdgeTest01_v20, rhel/9/x86_64/edge-pensaEdgeTest01_v21, rhel/9/x86_64/edge-pensaEdgeTest01_v3, rhel/9/x86_64/edge-pensaEdgeTest01_v7, rhel/9/x86_64/edge-pensaEdgeTest01_v8, and rhel/9/x86_64/edge-pensaEdgeTest01_v9. One image, 'rhel/9/x86_64/edge-pensaEdgeTest01_v21', is highlighted. To its right, a section titled 'Select one or more devices to apply the image to:' shows a dropdown menu set to 'Device rheledge01'. At the bottom right of this section is a large red 'Apply' button.

Figura 370 – Confirmation of "Edge" provisioning

11.0.3.4 Creation of a "Blueprint" provisioning request

To access the services page, click on the "blueprint" tab in the top menu. After doing this, you will find yourself on the "Blueprints" page.

On the page, a list of components called "Card" is displayed. Each card refers to a specific type of service; in particular, the following information is displayed:

- Service name.
- Service icon.
- Type of script used for service provisioning.
- Service description.
- "Subscribe" button to proceed with service creation.

Depending on the blueprint selected, the parameters for provisioning change, while the functionalities remain unchanged.



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The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there's a navigation bar with tabs for Dashboard, Virtual Machines, Storage, Kubernetes, Services (which is highlighted with an orange box), Blueprints (which is also highlighted with an orange box), and Workflow. Below the navigation, a breadcrumb trail reads 'Provisioning / Services'. On the left, there's a sidebar with a 'Filter by text' input and a 'Categories' dropdown menu containing items like AI & Machine Learning, Analytics, Application Runtime, Big Data, Blockchain, Cloud Provider, Compute, Containers, Database, and DevOps. The main content area displays a grid of blueprints. One blueprint, 'Text Analytics / NLP', has a yellow arrow pointing to its 'Subscribe' button. Other visible blueprints include PaaS - Nginx, Audio Analytics, Azure Resource Group, Redis DB, Subscription Alias Full Parameters PSN, Echo String, and Kafka. Each blueprint card includes a brief description and a 'Subscribe' button.

Figura 371 – List of blueprints

11.0.3.4.1 "BLUEPRINT" EXECUTION REQUEST

Click the "Subscribe" button corresponding to a "Blueprint". The user will be redirected to step 1 of the creation page. In this step, it is necessary to select the subsystem in which provisioning is to be performed from the dropdown.

The screenshot shows the 'Subscribe Blueprint' step of the execution request process. At the top, a header bar includes the Leonardo logo, a timestamp (16:56:15 07 may 2024), and language settings (English). Below the header, a breadcrumb trail reads 'Provisioning / Blueprints / Subscribe Blueprint'. A modal window titled 'Select a subsystem' is open, prompting the user to choose a subsystem. The dropdown menu shows 'Subsystem * OpenShift Default' selected. Below the dropdown, there are three numbered steps: 1 Select a subsystem, 2 Fill out your parameters, and 3 Start provisioning. The background of the page shows the previous 'List of blueprints' screen.



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Figura 372 – Step 1 of Blueprint creation

By selecting a subsystem, the page will move to step 2 of creation where it will be necessary to fill out the form with the specific configuration parameters of the selected blueprint.

Fill out the following steps in order to deploy the blueprint.

1 Select a subsystem

2 Fill out your parameters

k_node_count *

3

Numero di nodi

k_node_size *

Standard_DS2_v2

Dimensione dei nodi

helm_release_name *

Nome della release helm

helm_chart *

Nome della chart helm

helm_chart_version *

Versione della chart helm

k_cluster_name *

kubernetes-cluster

Nome del cluster Kubernetes

helm_repository *

Figura 373 – Step 2 of "Blueprint" creation

Once the parameters have been entered, you can click the "Start" button at the bottom right to initiate provisioning. After a few seconds, you will be redirected to the "Dashboard" page, filtered for "Blueprints to be completed".

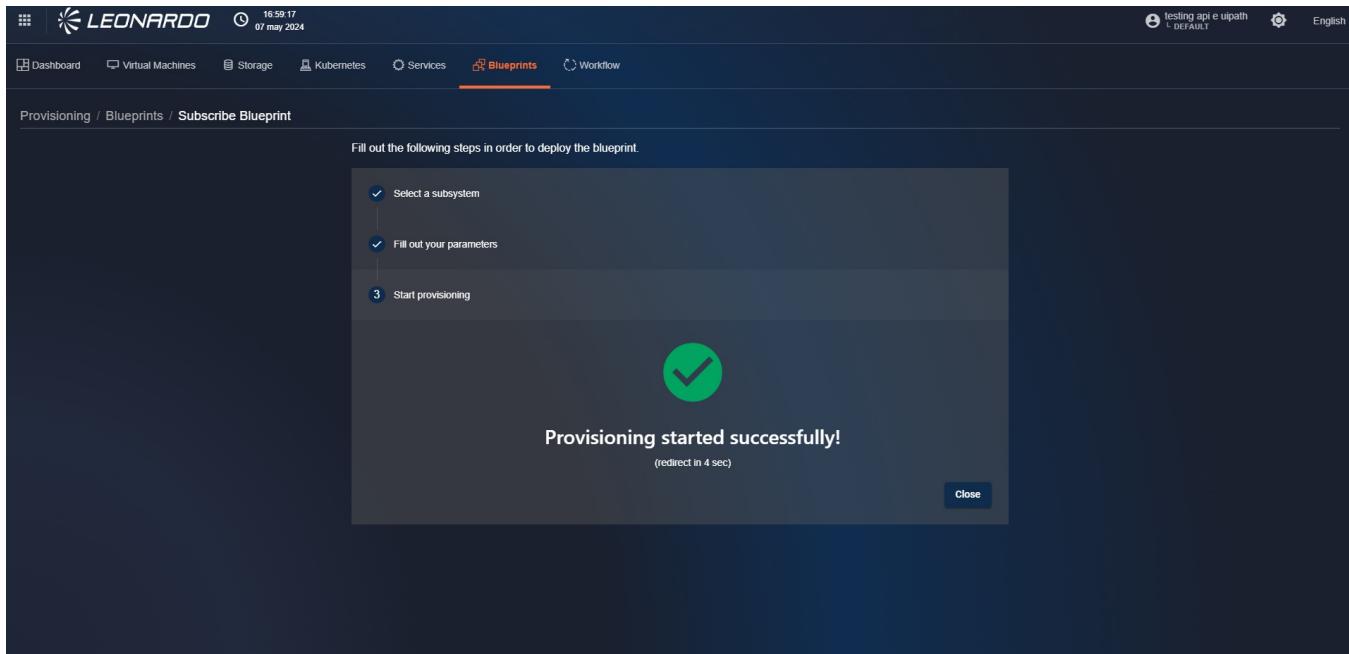


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*Figura 374 – Blueprint Request sent
successfully*

11.0.3.4.2 "TO BE COMPLETED" BLUEPRINT MANAGEMENT PAGE

To work on the blueprint, it is necessary to select a "to be completed" blueprint from the dashboard. Clicking on the corresponding row will display its management page.

This page is divided into sections, specifically:

- "Process Diagram": This section displays an image that graphically represents all the steps to be executed in the blueprint. Additionally, the step currently in execution is indicated in red.
- "Variables": In this section, we can view all parameters entered manually or automatically during the blueprint execution.
- "Task": In this section, it is possible to manage the blueprint steps that require manual intervention using the available controls.
- "Subprocess": In this section, we can view the status of all automatic operations performed during the blueprint execution.

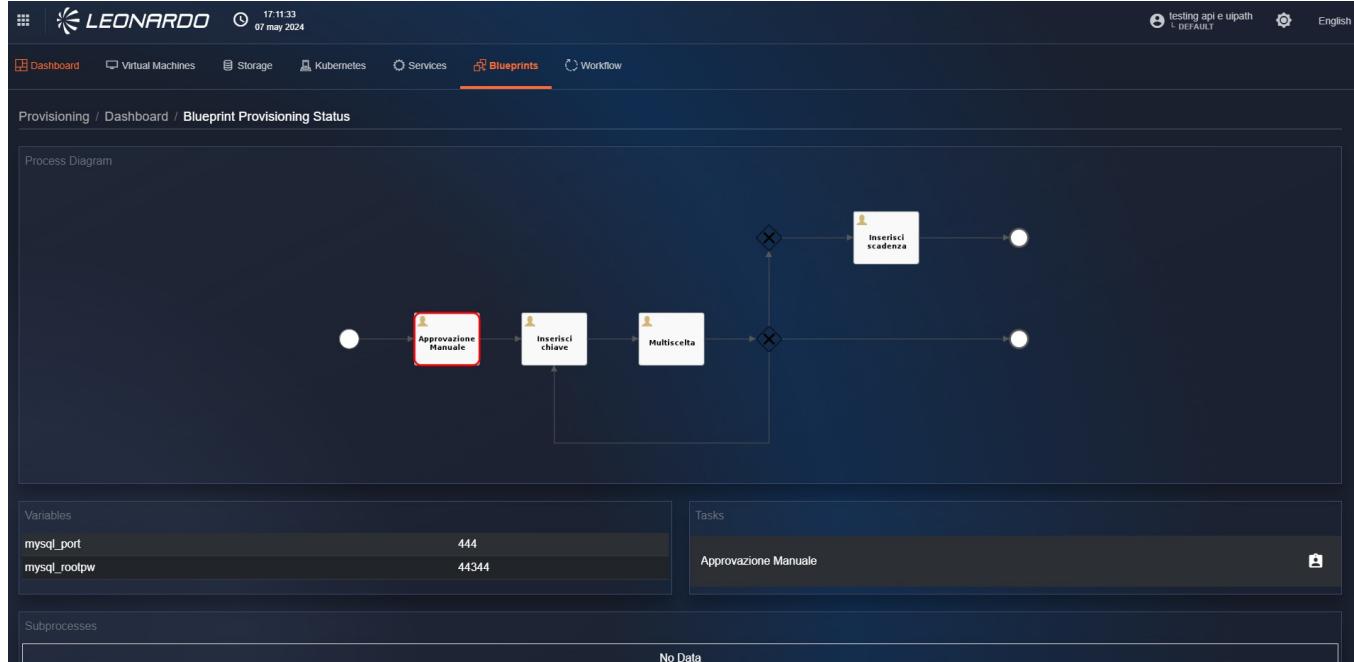


Figura 375 – Provisioning plan flow

The execution, and therefore the corresponding change, between the Blueprint steps can be carried out in two ways: automatically or manually, exactly as described within the Blueprint itself.

11.0.3.4.2.1 Automatic steps

The system automatically manages the creation, configuration of resources, and deployment of applications. The status and result of these steps are visible in the "Subprocess" section below.

For each row in the table, by clicking the buttons on the right, it is possible to verify the generated output message and download its content.



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*Figura 376 – Blueprint subprocesses
section*

11.0.3.4.2.2 Manual steps

Manual tasks, when present and required in the blueprint, will appear in the relevant section. To work on it, it is first necessary to click the "Assign" button (red in the figure) to take charge of the task.



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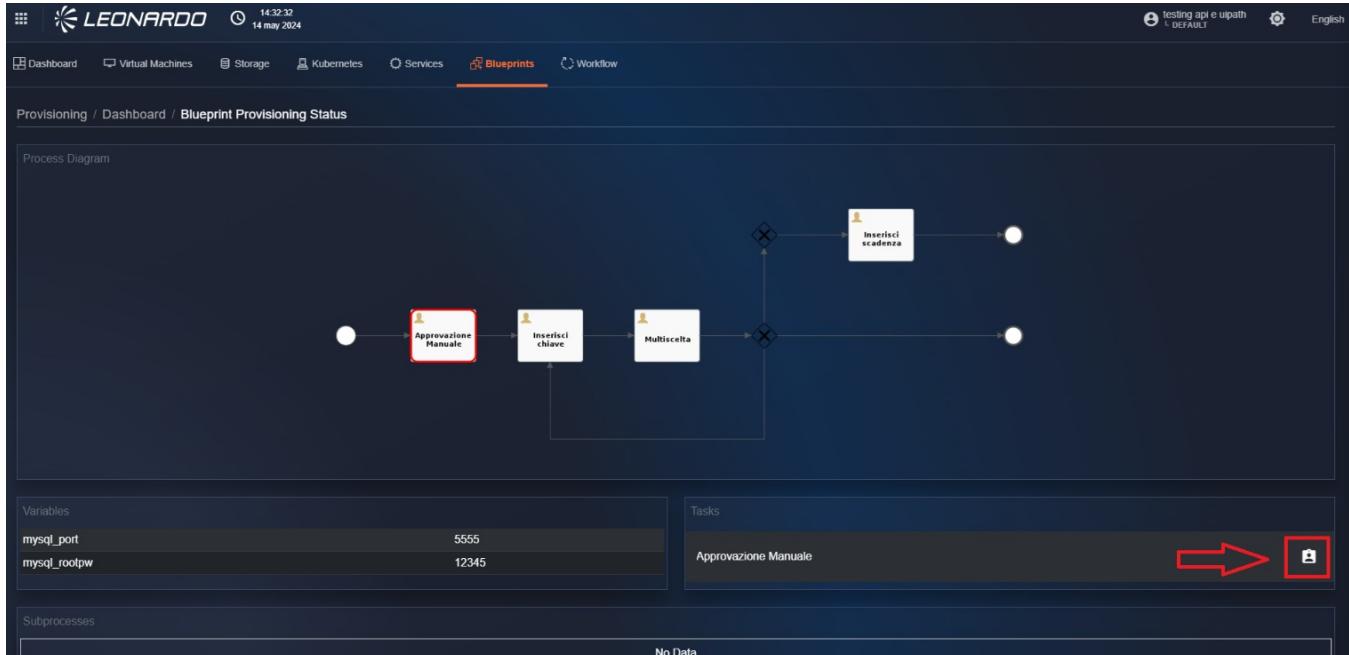


Figura 377 – Task assignment to the user

A confirmation modal for assignment will be displayed. By clicking "Yes", the task will be taken over by the user and cannot be worked on by a different user.

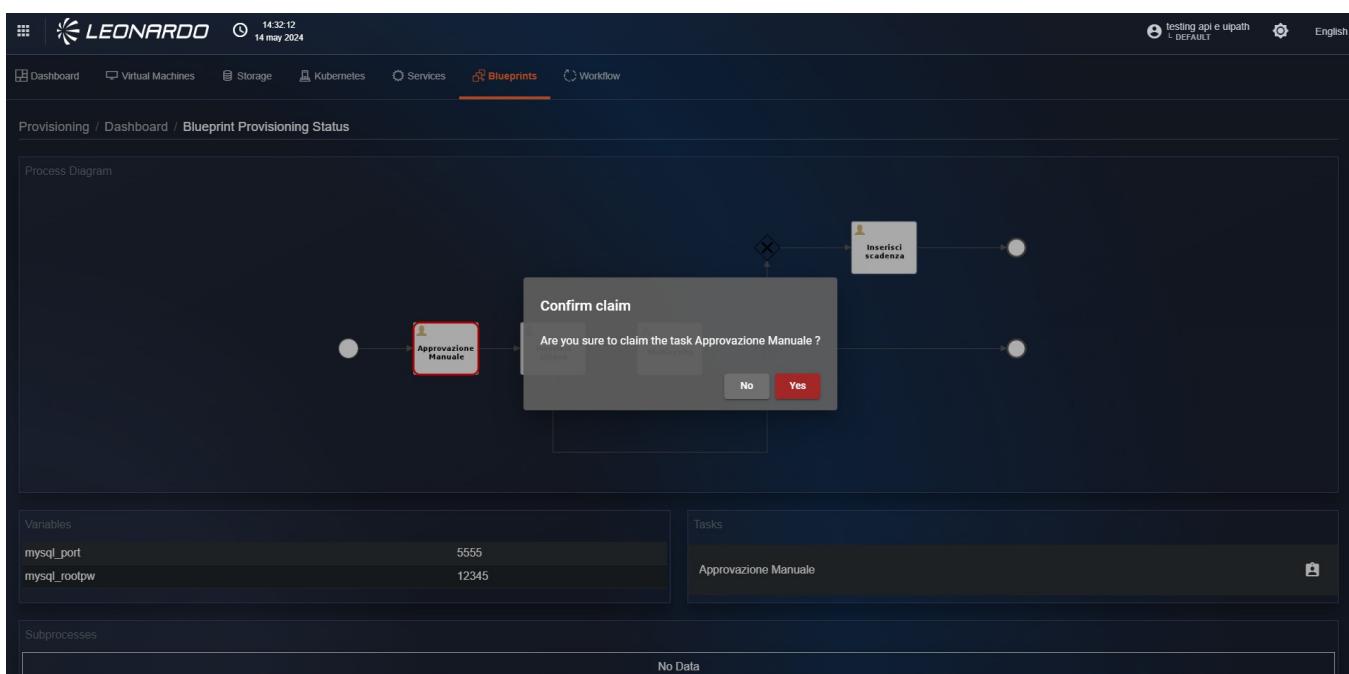


Figura 378 – Assignment confirmation

A confirmation message will appear at the bottom, and we can note that the "Task" section has been updated. On the left, below the task name, the relevant assignee is indicated, and on the right, there are 2 buttons:

- "Remove assignment" (red in the figure).
- "Complete manual task" (yellow in the figure).

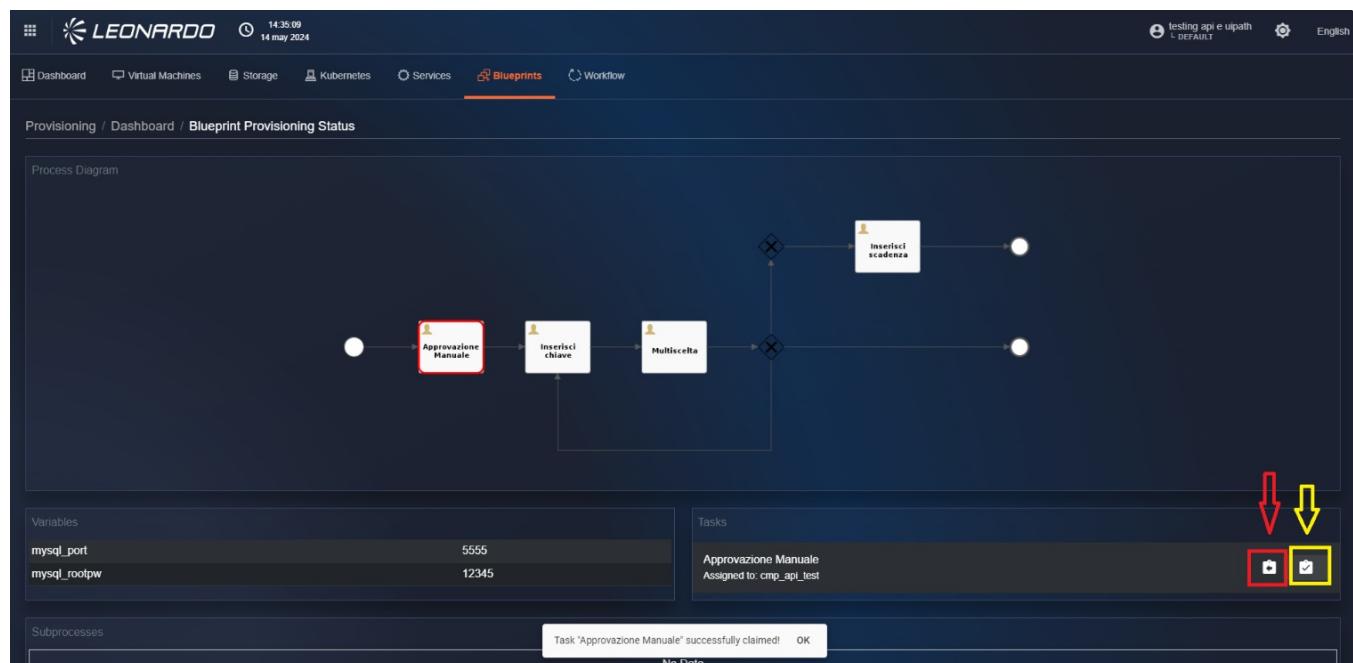


Figura 379 – Task management buttons

Clicking "Remove assignment" will open a confirmation modal. Clicking "Yes" will make the task available to other users who can take charge of it.

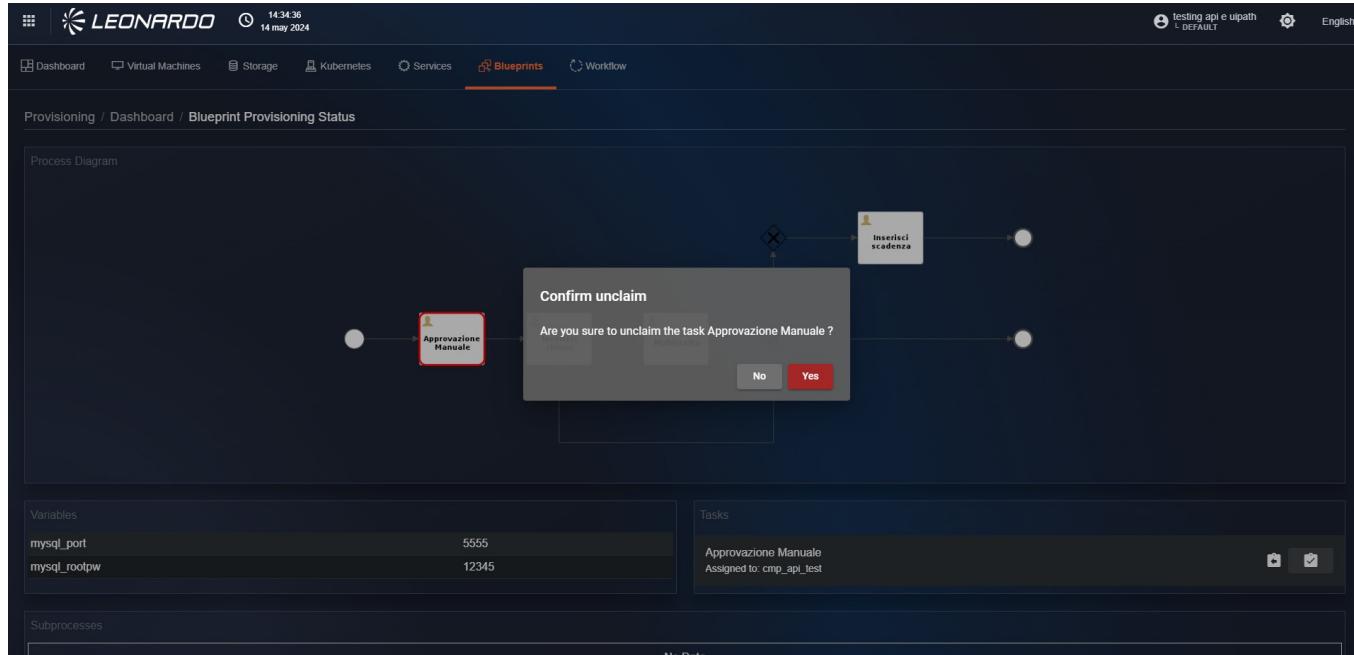


Figura 380 – Task release

Clicking the "Complete task" button will open a modal containing one or more customizable fields. The fields can be of different types.

We can enter numeric, boolean, and text fields. Once entered, it is possible to confirm by clicking the "Continue" button at the bottom right.



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The screenshot shows a 'Blueprints' tab selected in a navigation bar. A central modal window titled 'Manual intervention required' contains a numeric input field labeled 'Inserisci chiave' with the value 'A very long number'. Below the input field are two buttons: 'Cancel' and 'Complete'. To the left of the modal is a 'Variables' section with entries for 'mysql_port' (5555) and 'mysql_rootpw' (12345). To the right is a 'Tasks' section showing a task named 'Approvazione Manuale' assigned to 'cmp_api_test'. The bottom of the screen displays a 'Process Diagram' and a 'Subprocesses' section.

Figura 381 – Numeric fields of blueprints

This screenshot is identical to Figura 381, showing the same 'Blueprints' tab, 'Manual intervention required' modal with a numeric input field, and the same 'Variables' and 'Tasks' sections. The only difference is the text in the modal: the input field is now labeled 'Key' and contains the value 'djisf9343fcdfko-fo44nifc_zzer4'.

Figura 382 – Text fields in Blueprints

Once pressed, we can see that the BPMN graph on the page has been updated and that the next step of the blueprint is active and has a red outline.

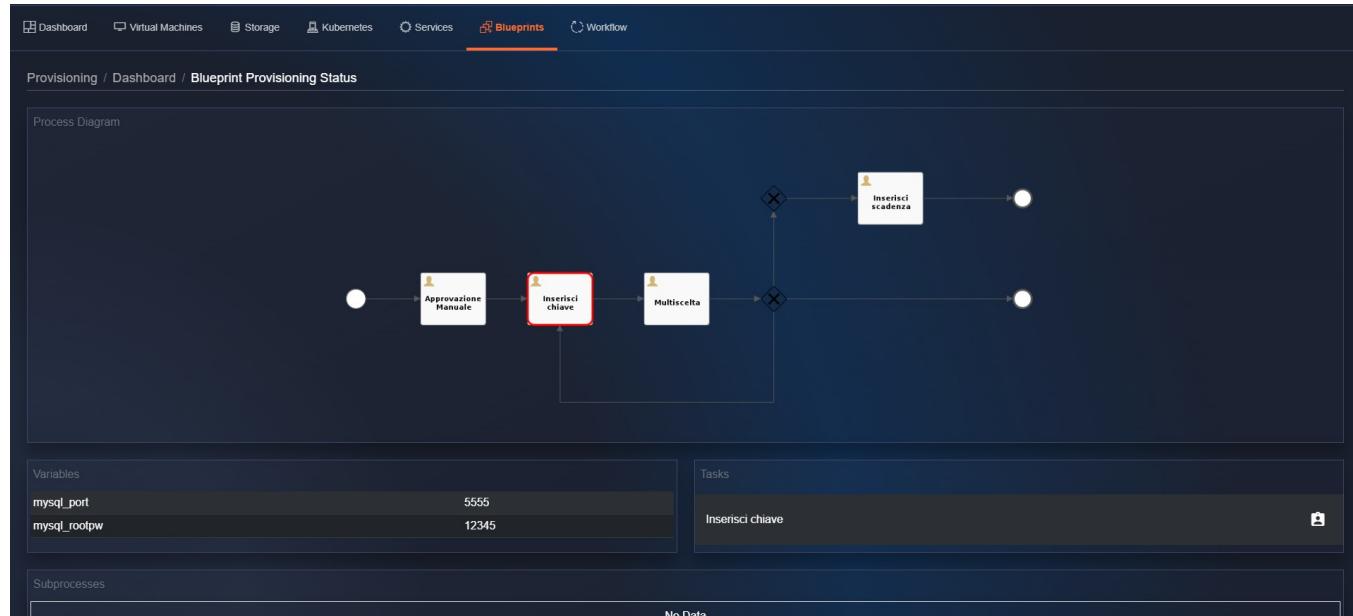


Figura 383 – Next step

All manual tasks present in the blueprint will follow the procedure described previously; therefore, regardless of the type of data to be entered, it is always necessary to assign the task to oneself.

It is possible to insert a temporal field within the manual steps of blueprints, using a calendar it will be possible to manually select the correct day and time.



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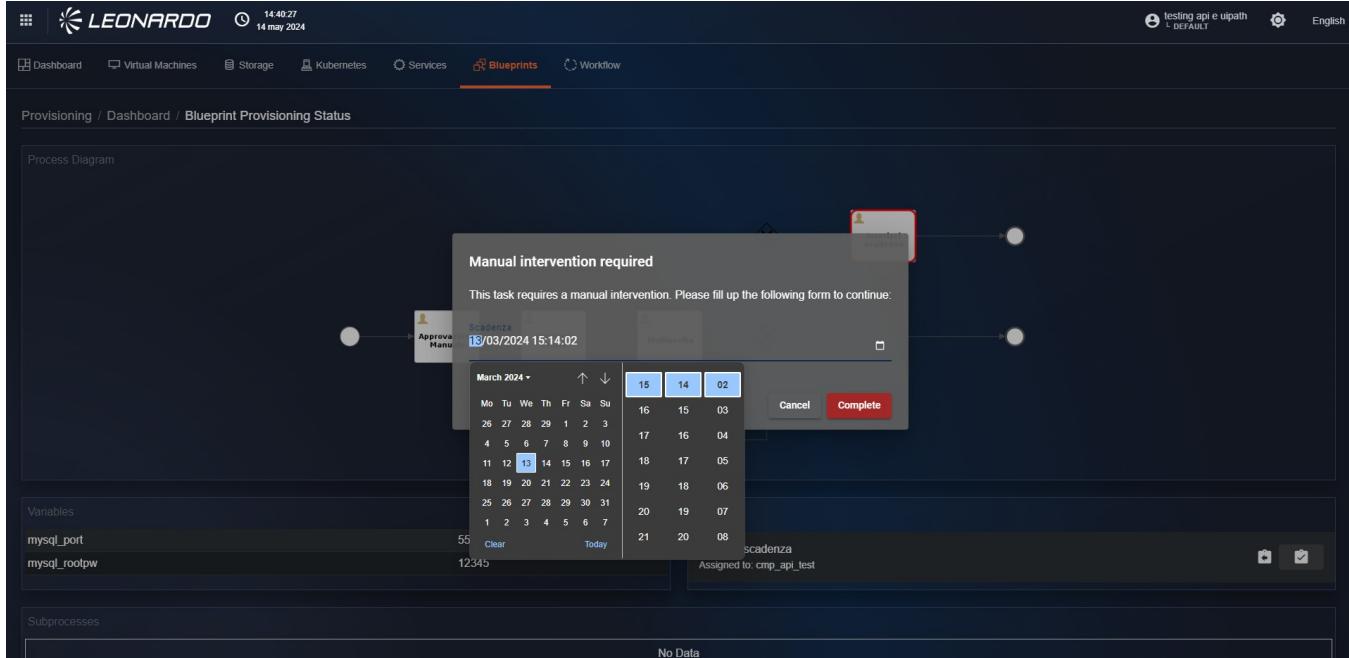


Figura 384 – Date field in tasks

The last type of step that we can find within the blueprints is the "Multi-choice" field. This field allows managing the blueprint's flow.

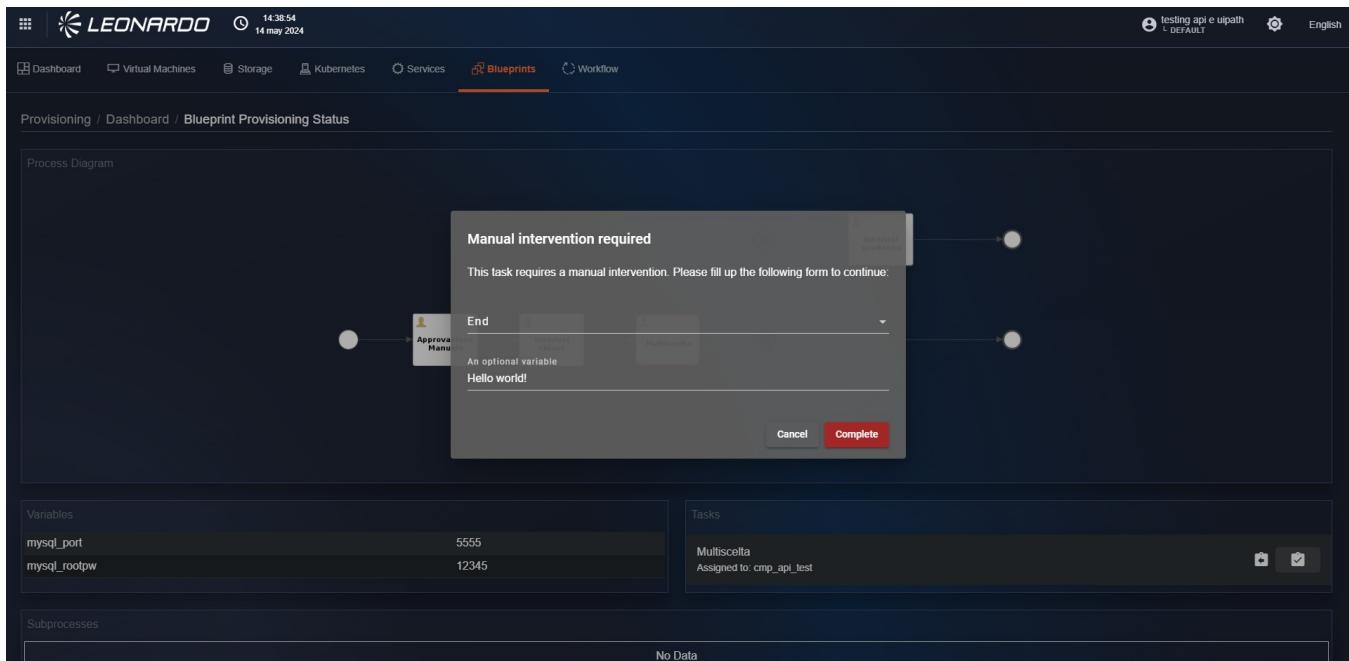


Figura 385 – Multi-choice field

This field is of "Selection" type, so it will not be possible to enter a custom value, but selectable options will be proposed. Specifically, we can find three choices:

- "Repeat": allows re-executing the previous steps as described in the blueprint (path in pink in the figure).
- "End": allows concluding the blueprint execution without performing further operations (path in yellow in the figure).
- "Insert date": allows moving to a subsequent step of the blueprint (path in green in the figure).

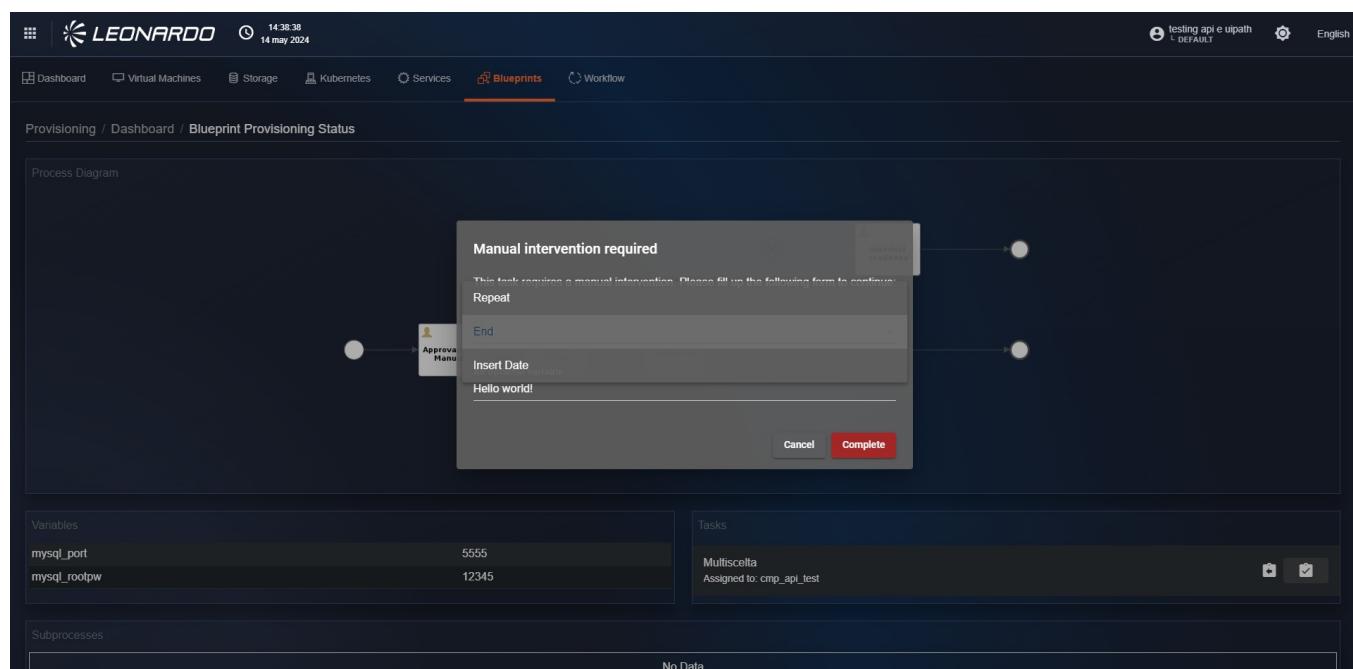


Figura 386 – Multi-choice field values

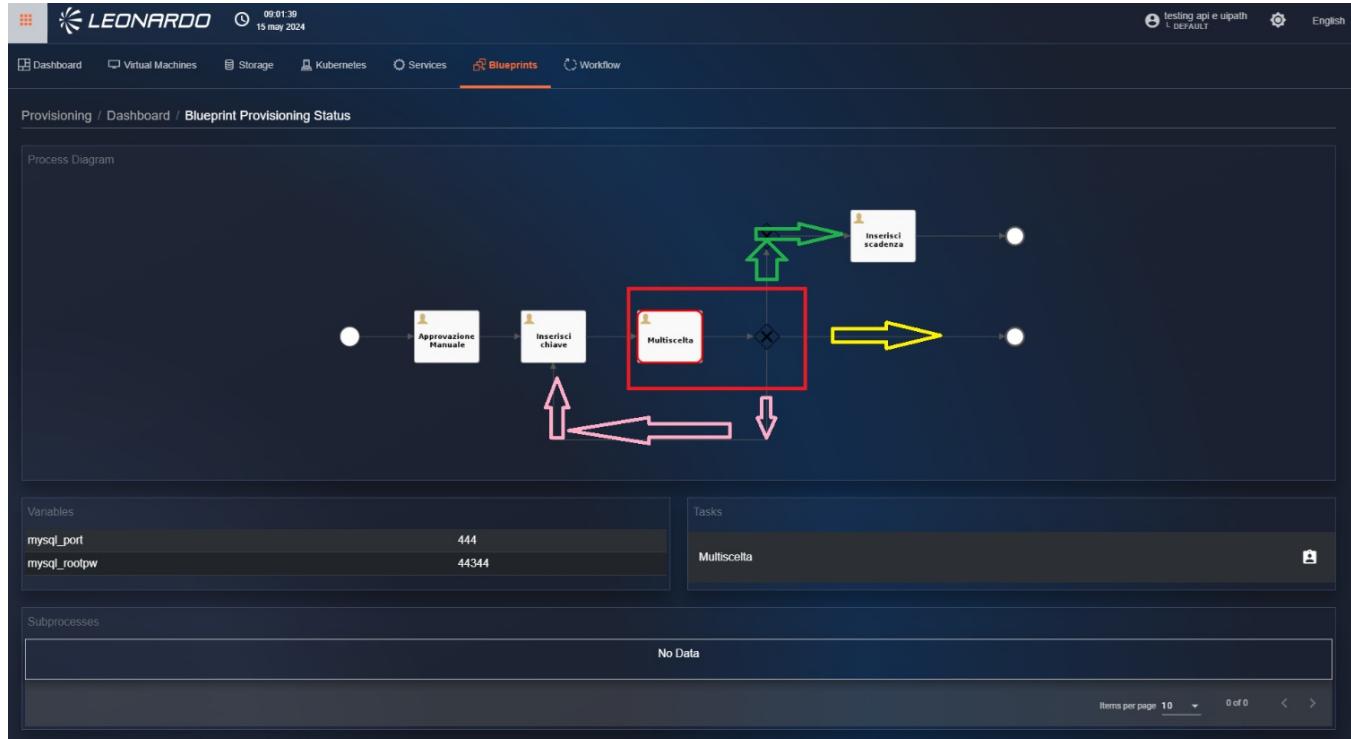


Figura 387 – Possible state changes for
Multi-choice

Once all blueprint steps are completed, the graph will be automatically removed from the page, and in the step section, it will no longer be possible to take charge of an operation. Furthermore, in the "sub-processes" section, we will be able to view the result of all automated steps in the blueprint.



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The screenshot shows a dark-themed web interface for managing cloud resources. At the top, there's a navigation bar with icons for Dashboard, Virtual Machines, Storage, Kubernetes, Services, **Blueprints** (which is highlighted in orange), and Workflow. Below the navigation, the URL is shown as Provisioning / Dashboard / Blueprint Provisioning Status. On the left, there's a sidebar with sections for Variables and Subprocesses. The Variables section contains two entries: mysql_port with value 5555 and mysql_rootpw with value 12345. The Subprocesses section says 'No Data'. To the right, there's a large panel titled 'Tasks' which displays the message 'No task currently available.' At the bottom right of the main content area, there are buttons for 'Items per page' (set to 10), 'Close', and navigation arrows.

Figura 388 – Blueprint completion

11.0.3.5 Modification of a performed provisioning

For a provisioning that has been carried out and has failed, it is possible to modify it.

Provisioning modification is only available for resource types.

To start modifying a provisioning, click on a failed forecast.



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UUID	Received Time	Sent Time	Created by	Status	Success	Output Message	State	Type
OH6yw9_oQxqUo7Dlc42g	12/2/22, 3:22 PM	12/2/22, 3:21 PM	cmp_admin (cmp_admin@email.com)	Completed	✓			VM
zMPHlaRr-mu6JZ21MuZA	11/29/22, 10:51 AM	11/29/22, 10:49 AM	cmp_admin (cmp_admin@email.com)	Completed	✓			VM
GplL7KWyTNS_tNbmslR8pQ	11/29/22, 10:40 AM	11/29/22, 10:39 AM	cmp_admin (cmp_admin@email.com)	Failed	✗			VM
p33VepWxTl6zB3YafpaHQ	11/29/22, 10:37 AM	11/29/22, 10:36 AM	cmp_admin (cmp_admin@email.com)	Failed	✗			VM

Figura 389 – Start modification of a Provisioning

After doing so, you will find yourself on the "Config" page of step 2 where you can modify the previously entered parameters.

Figura 390 – Configuration parameters



The screenshot shows a form for modifying parameters. At the top, there is a checkbox labeled "Add storage". Below it, there is a section for "User name for access" with a field containing "admin123" and a password field with masked input. A "Tags" field is present below. At the bottom, there are "Reset" and "Submit" buttons.

Figura 391 – Modification of parameters

After modifying the necessary parameters, at the bottom right, click the "Submit" button.

By doing so, you will find yourself on the "Plan" page of step 3, where the forecast is present, and below, the quote table.

At the bottom right, click the "Apply" button. After clicking the "Apply" button, you will find yourself on the "Dashboard" tab page.

Subsequently, from the "Dashboard" page, the user notes that the modification was successful.

It is also possible to modify a failed provisioning for other elements managed by SCMP.

The screenshot shows a provisioning summary page. At the top, there is a header with the Leonardo logo and a timestamp. Below the header, it says "Provisioning / Virtual Machines / 7LFHR5VDSVq0Gr9qcTJbEg / edit". The main area contains a "Subsystem" section with a "Config" button and a "Plan" button. It displays a Terraform execution plan with resource actions (create) and a list of actions. Below this, there is a "Costs" table:

Type	Amount	Unit	OS	Zone	Reservation Term	Description	Meter ID	Tier Minimum Units
CONSUMPTION	€0.15	1 Hour	LINUX	-	-	-	-	-
RESERVATION	€0.06	3 Years	LINUX	-	3 Years	-	-	-
RESERVATION	€0.09	1 Year	LINUX	-	1 Year	-	-	-

At the bottom, there are "Back" and "Apply" buttons.

Figura 392 – Provisioning summary and



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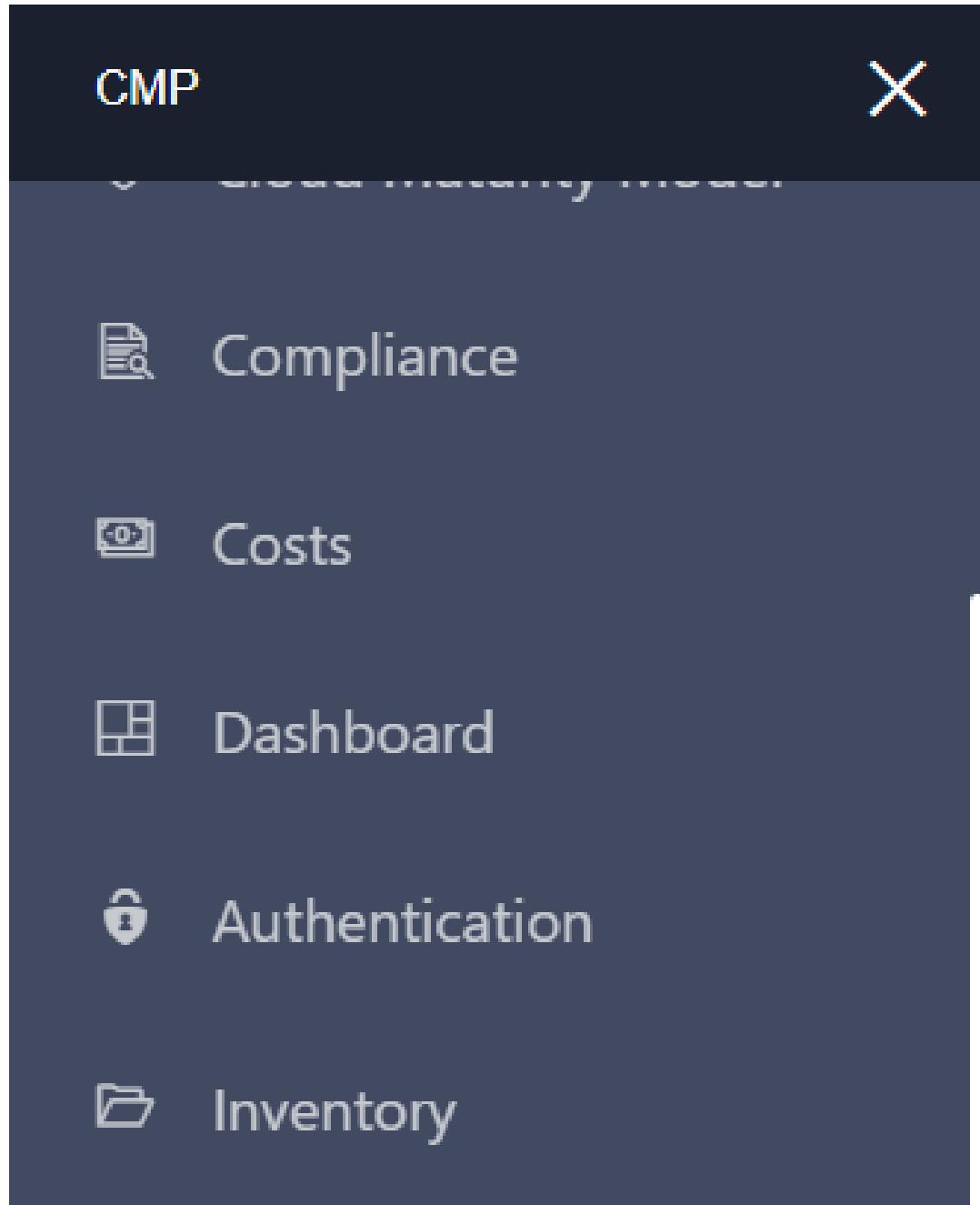
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quote table

Backup and disaster recovery

The "Backup & Disaster Recovery" functionality allows the user to view an overview of the data available and configured in the CommVaults that have been correctly inserted into the "Administration" functionality. To access the functionality, it is necessary to click on the button available in the main menu. .



 Log And Audit

 Monitoring

 Provisioning

 Tool Risk

 Security

 Tenants

 Qualizer One View

 Backup & Disaster



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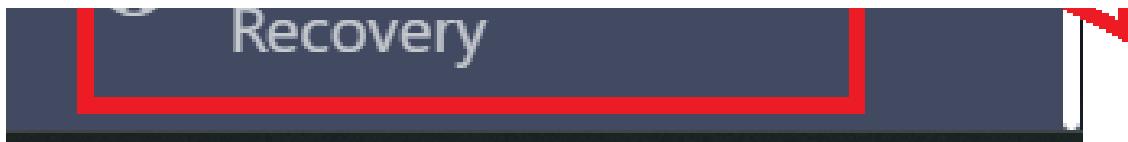
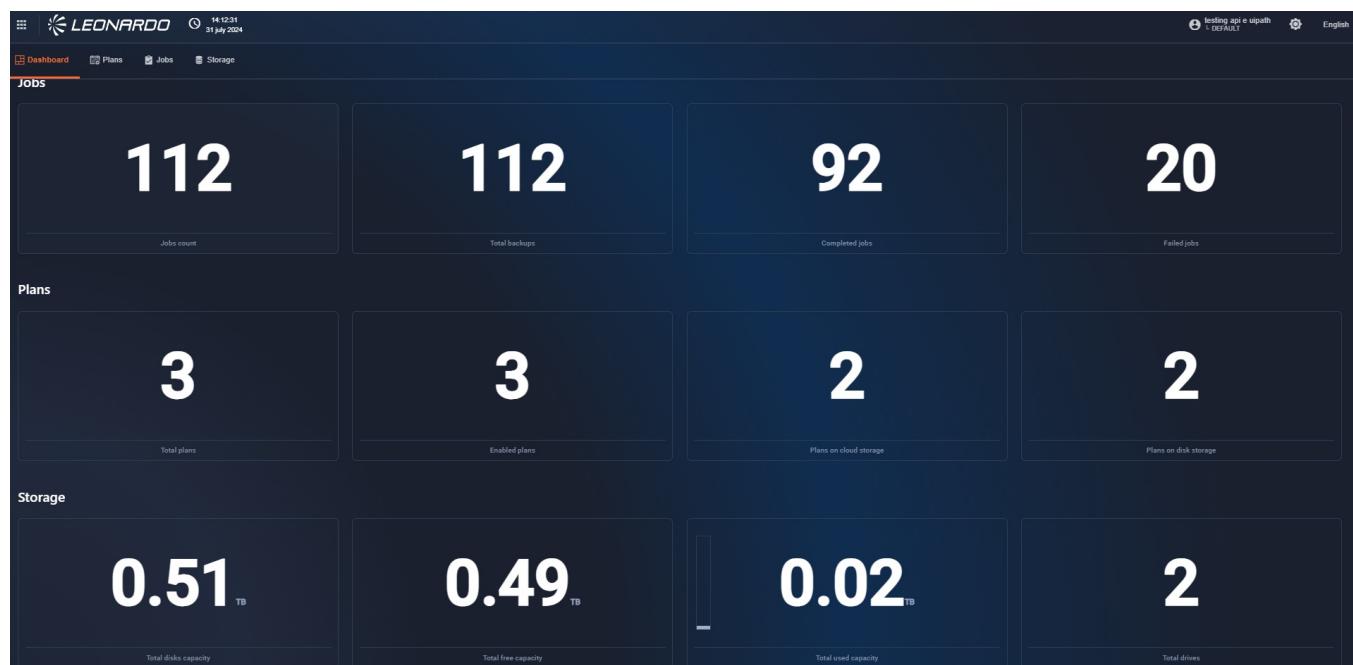


Figura 393 – Access to Backup & Disaster Recovery

Dashboard

The dashboard, divided into sections, offers a general overview of the content of the CommVaults; subsequently, to consult the details of each section, it is necessary to use the tabs at the top.



*Figura 394 – D.R. functionality
Dashboard*

Plans

The "Plans" page contains, in addition to a filter that allows selecting the CommVault for which we want to view the details, the list of configured plans.



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Plan ID	Name	Type
1	1_settimana_disk	Server
2	1_settimana_cloud	Server
3	1_settimana_email	Server

Figura 395 – List of plans

By clicking on an element of the table, which represents a "plan", a window with the details of the selected plan will be displayed; furthermore, by clicking on the name of the displayed storage, the user will be redirected to the storage details.

Figura 396 – Details of the Plans

Jobs

The "Jobs" page contains, in addition to a filter that allows selecting the CommVault for which we want to view the details, the list of results of the jobs performed by the CommVault.



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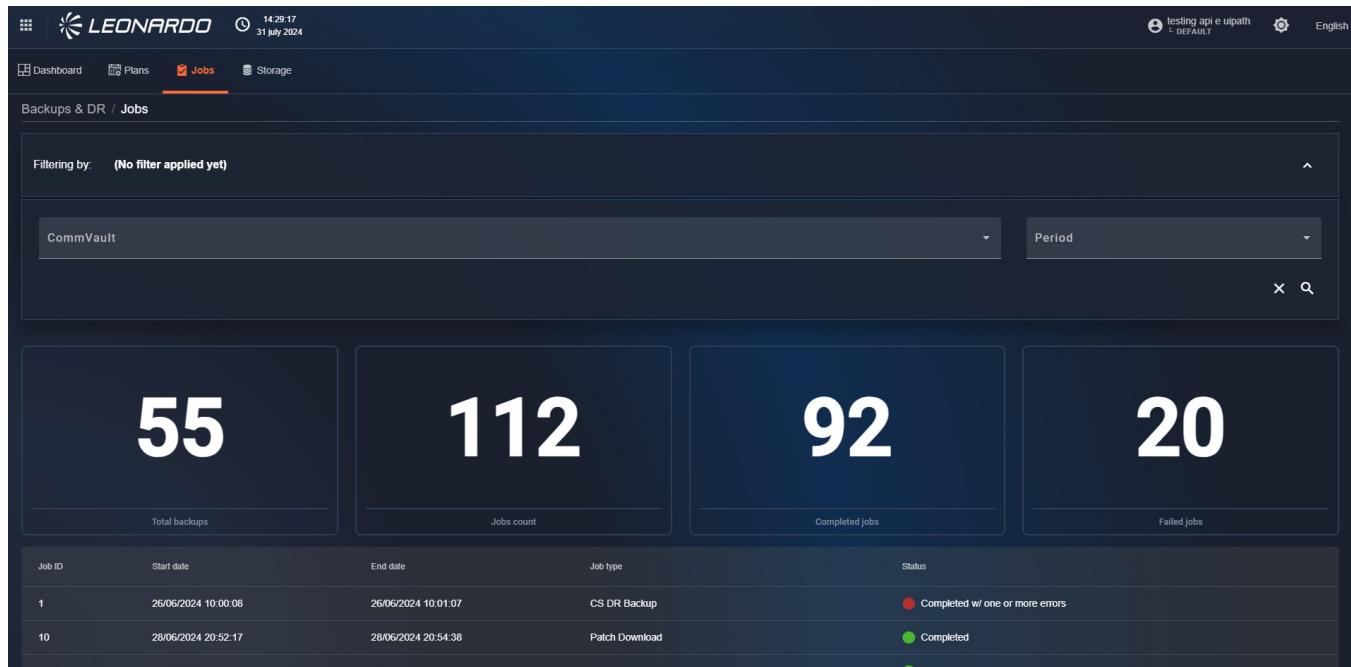


Figura 397 – List of Jobs performed

By clicking on an element of the table representing a "Job", a window with the details will be displayed.

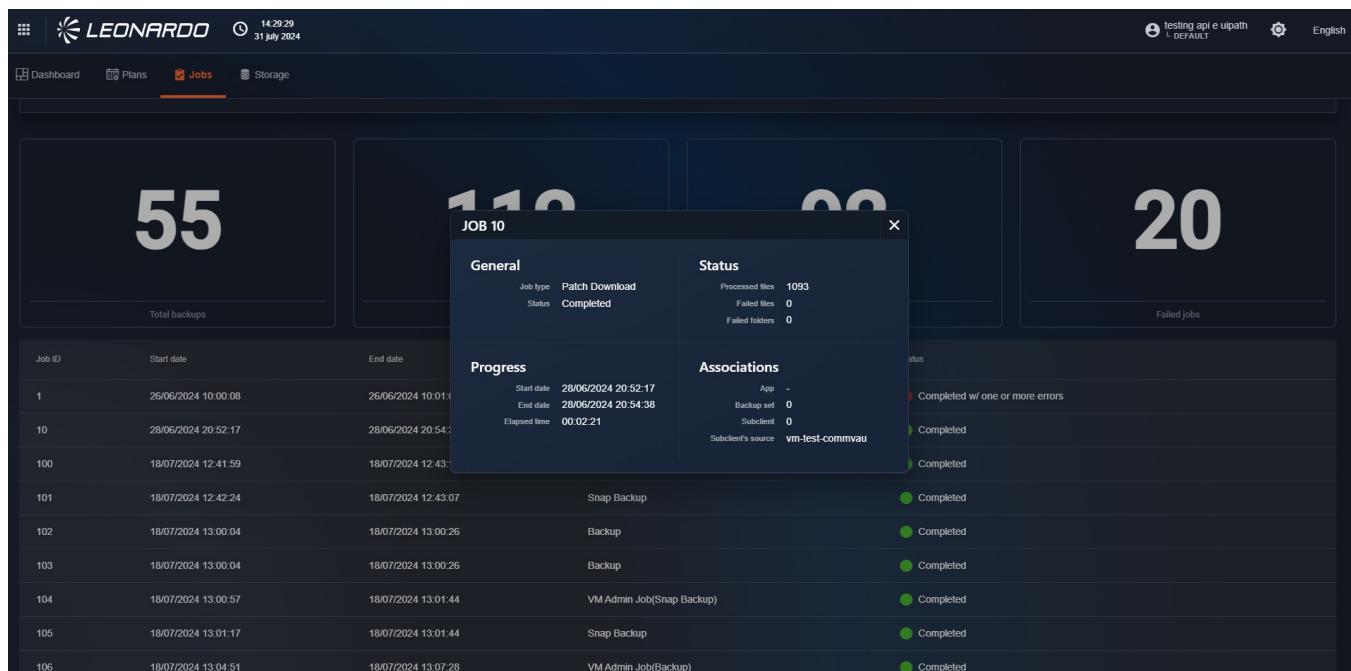


Figura 398 – Job Details



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Storage

The "Storage" page contains, in addition to a filter that allows selecting the CommVault for which we want to view the details, the list and information on storage and their relative capacities.

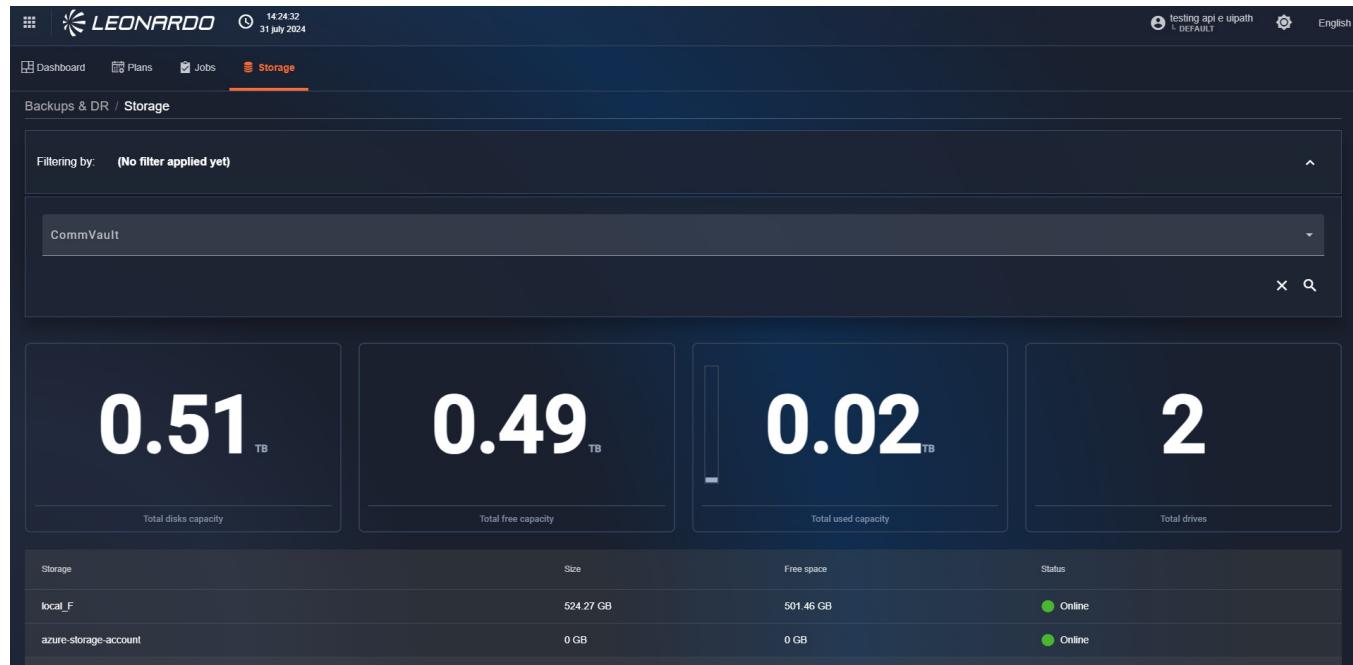


Figura 399 – List of available storage

By clicking on an element of the table, which represents a "storage", a window with the details will be displayed; furthermore, by clicking on the name of the displayed "plan", the user will be redirected to its details.



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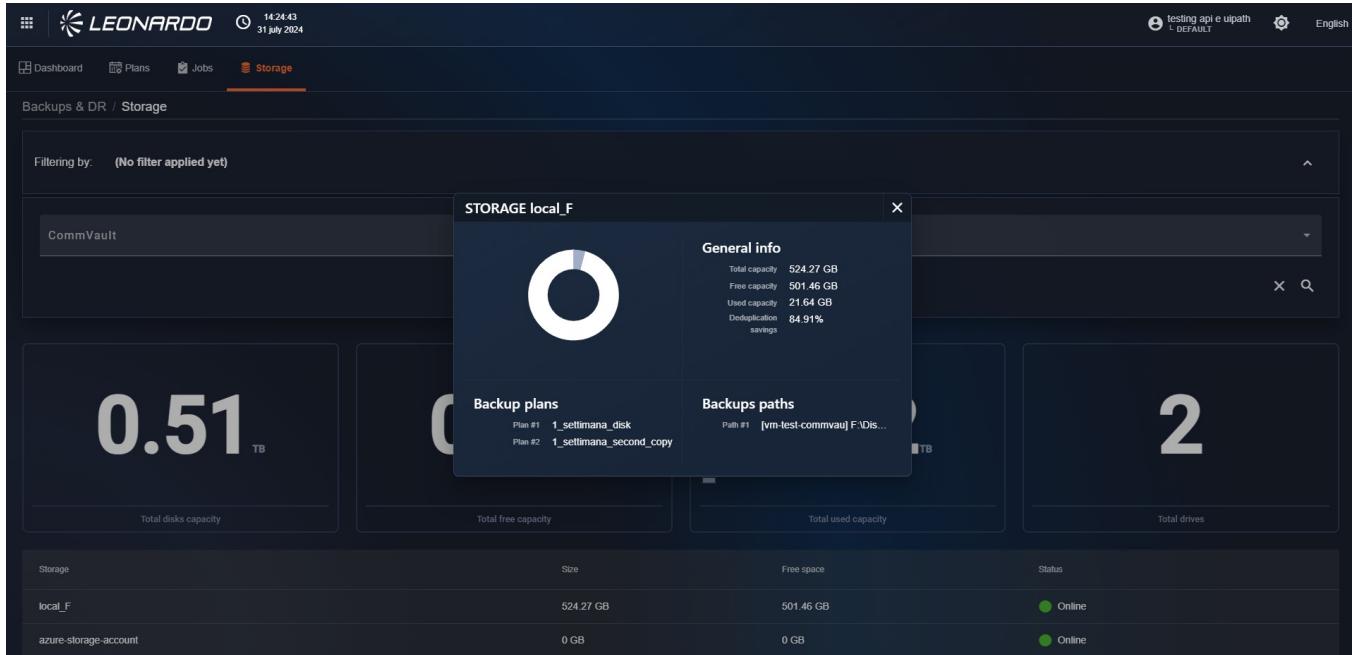


Figura 400 – Storage details

Shared Features

This section outlines some general behaviors.

Multilingual Support

The operator interface is available in two languages (English – Italian) and the operator can choose the language simply by selecting the text in the top left of the screen.

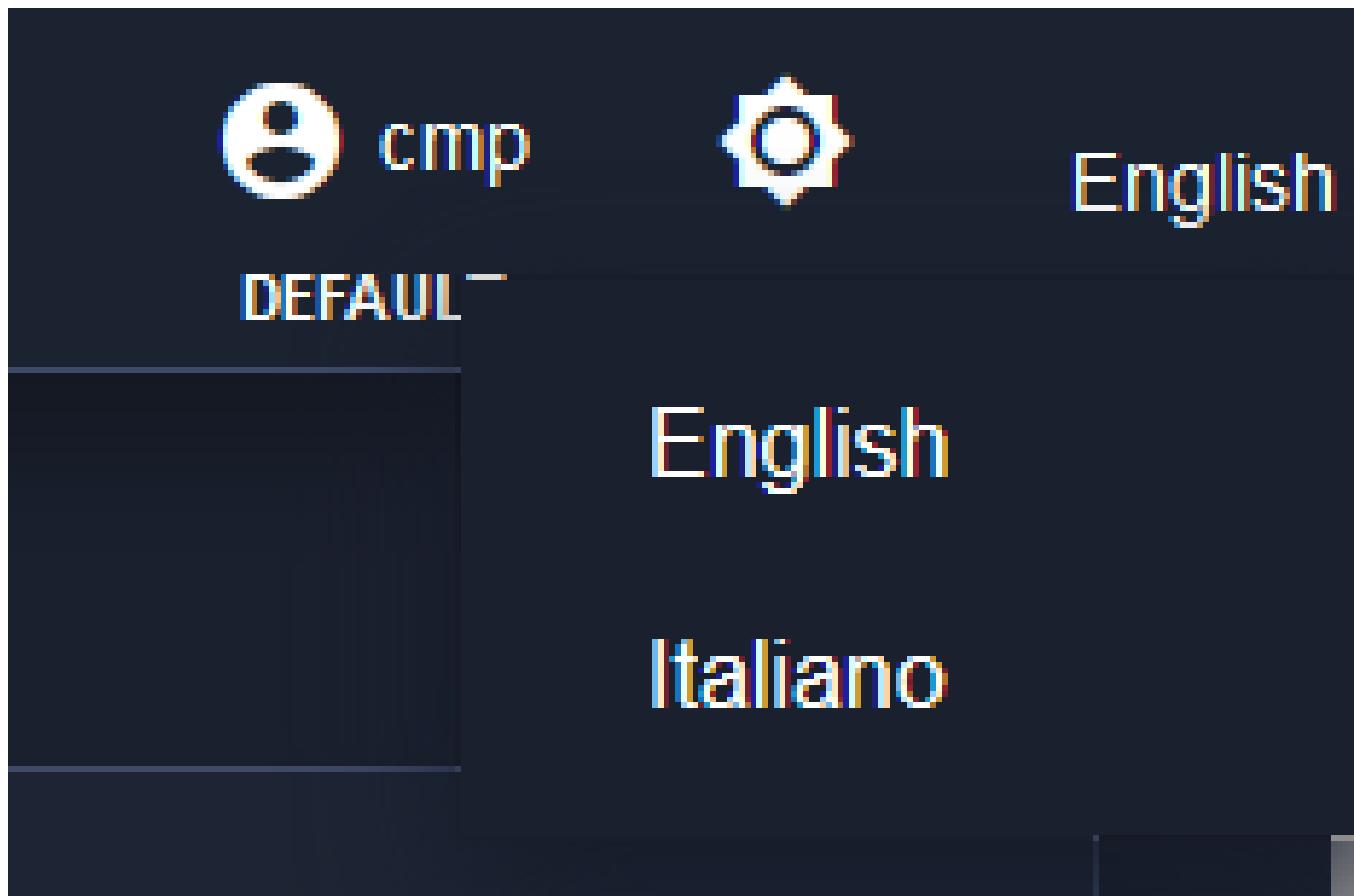


Figura 401 – Menu to change the language

Filter Reset



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For the Monitoring, Costs, Inventory, Catalog, and Security functionalities, within the filters, it is possible to reset them and the lists by clicking on the button depicting an "X", located below the calendar filter.

The screenshot shows the SCMP interface with a dark blue header. The header includes the Leonardo logo, the date and time (5:01:59 pm, 12 september 2022), and user navigation options (cmp, English). Below the header is a breadcrumb trail: Monitoring / Dashboard / Virtual Machine. The main area is titled 'Virtual Machine' and contains a 'Filtering by:' section with three buttons: DATE RANGE 01/09/2022 - 12/09/2022, GRANULARITY 30 Minutes, and TYPE VM. Below this is a search bar labeled 'Search by tags' and a dropdown for 'Granularity' set to '30 Minutes'. Further down are dropdowns for 'Provider', 'Subsystem', 'Resource', 'Metric Name', and a date range selector from '01/09/2022 – 12/09/2022'. A red arrow points to the 'X' button located at the bottom right of the filtering section. A message at the bottom center of the screen says 'Please select Resource UUID and a Metric to show the chart!'

Figura 402 – Filter settings detail

Light mode

To activate light mode across the entire SCMP platform, in the top right of the menu bar, click on the button depicting the sun as shown below.

The screenshot shows the SCMP interface in Light mode, indicated by the white background. The header is identical to the previous screenshot, featuring the Leonardo logo, date and time (4:22:51 pm, 29 september 2022), and user navigation options. The main area displays an 'Inventory' dashboard with a large circular chart titled 'CMP' showing resource usage. The legend indicates four categories: STORAGE (yellow), VM (light blue), K8S (dark blue), and NETWORK (red). The total value '575' is displayed in the center of the chart. A red arrow points to the sun icon in the top right corner of the header, which is used to toggle between Light and Dark modes.



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Figura 403 – Activating light mode

To deactivate light mode, click on the button depicting the moon as shown in.

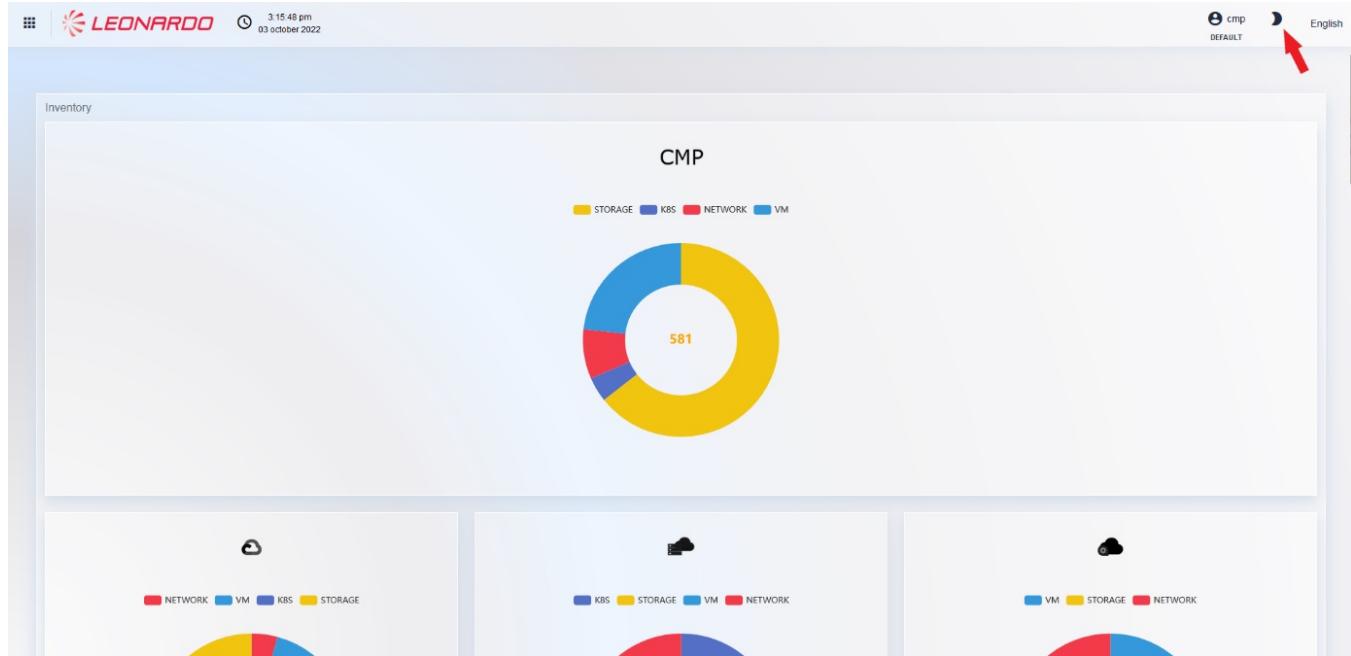


Figura 404 – Deactivating light mode

Switch Tenant

To switch from one Tenant to another, click on the button depicting a person icon. At this point, a dropdown menu appears where you need to click on "Switch Tenant".



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Name	Description	Creation Date	Status
manual	only manual	10/04/2024 08:09:07	✓
name	dscr	10/04/2024 09:45:36	✗
myBlueprintName	description	10/04/2024 09:46:13	?
isAnewName	descrizione32	10/04/2024 09:46:51	

Blueprint's archive upload success! OK

Figura 405 – Menu for Tenant switch

After clicking on “Switch Tenant”, a modal appears where you can select a Tenant to switch to. After selecting the desired Tenant, click on the “Confirm” button.

The system automatically verifies the tenant's enablement and existence before performing the switch.

After doing so, the page updates with the desired Tenant, where you can view all data belonging to it across all platform functionalities.



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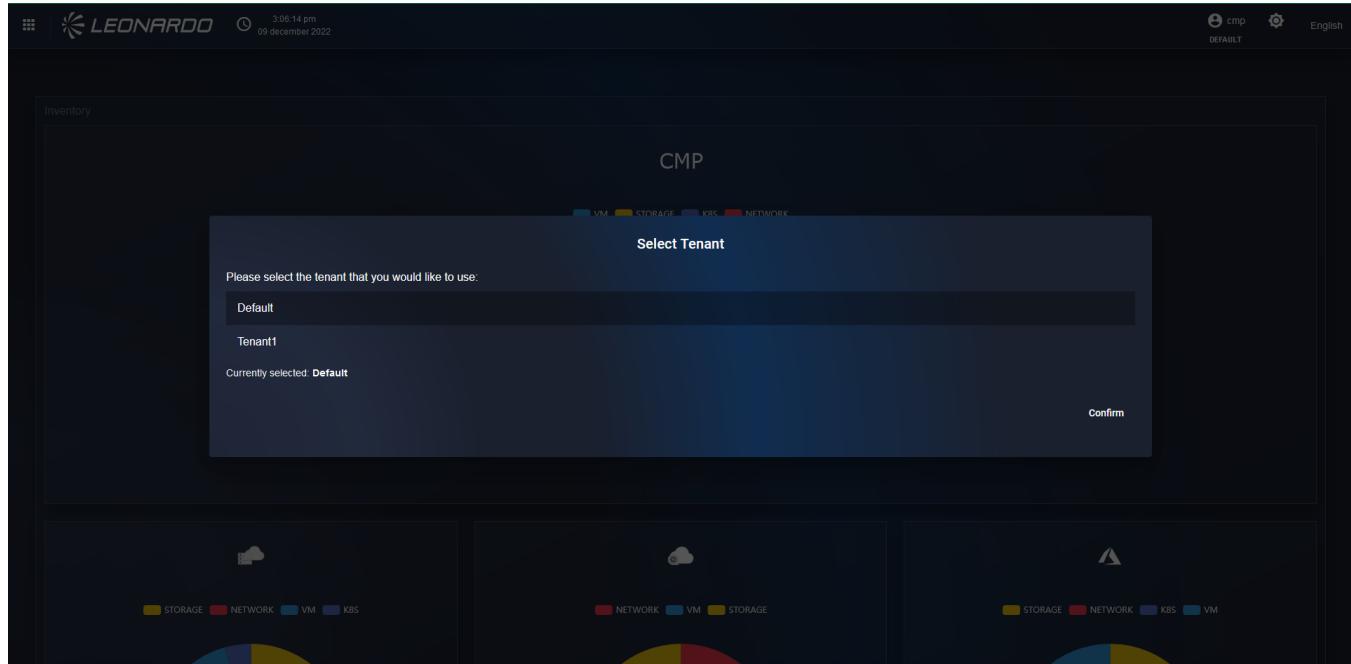


Figura 406 – Tenant Switch

Managing Columns in Available Tables

For the tables available in SCMP, the user has the ability to customize the column display in two ways:

- Modify the order of the displayed columns.
- Change the number of columns shown.

These preferences are saved within the system, using the user identifier and the current page as references.

To customize the display, it is necessary to click on the “filter columns” button, shown with a “funnel” icon, available in the top right section of the respective table.

LEONARDO 10.02.06
15 november 2024

Resources Virtual Machines Data Stores Clusters Networking Security Others What If Reports

Inventory / Resources

Inventory resources (16349)

Filtering by: (No filter applied yet)

Search Search by tags

Search by provider Search by Subsystem

Provider Name System Size Resource Group Type Creation Date Confidential Provisioned on In C... T

Provider	Name	System	Size	Resource Group	Type	Creation Date	Confidential	Provisioned on	In C...
0-archive-asf11-tenant-pool-0	Cluster 02	-	-	PERSISTENTVOLUMECLAIM	28/10/2024	-			T
0-archive-pool-0	Cluster 02	-	-	PERSISTENTVOLUMECLAIM	28/10/2024	-			T
0-minio-archive-tenant-pool-0	Cluster 02	-	-	PERSISTENTVOLUMECLAIM	28/10/2024	-			T
0-minio-asf11-tenant-pool-0	Cluster 02	-	-	PERSISTENTVOLUMECLAIM	28/10/2024	-			T
0-minio-customer-tenant-p...	Cluster 02	-	-	PERSISTENTVOLUMECLAIM	28/10/2024	-			T
0-minio-pool-0	Cluster 02	-	-	PERSISTENTVOLUMECLAIM	28/10/2024	-			T

VMs Storage Networks Cluster Kubernetes Security Other

Category	Percentage
Storage	36.4%
VMs	25.3%
Networks	23.8%
Other	1.62%
Cluster Kubernetes	0.36%

Figura 407 – Column Management

A configuration modal will open, containing the ordered list of all fields currently displayed on the interface.

We can use the “drag n’ drop” technique by clicking on the “Vertical dots” button corresponding to the field we want to move, then we can release the component in the correct position.

The screenshot shows the LEONARDO platform interface. At the top, there's a navigation bar with tabs for Resources, Virtual Machines, Data Stores, Clusters, and Networking. The Resources tab is selected. The main area displays 'Inventory / Resources' with a count of 16349. A red arrow points from the 'Provider' column header in the table to the 'Provider' option in the 'Columns Options' modal. Another yellow arrow points from the 'Search by provider' input field to the 'Resource Group' dropdown in the same modal. The 'Columns Options' modal lists several filter categories: Provider, Name, System, Size, Provisioned on (with Resource Group selected), Type, Creation Date, Confidential, In Catalog, and Status. At the bottom of the modal are 'Restore Default' and 'Save' buttons.

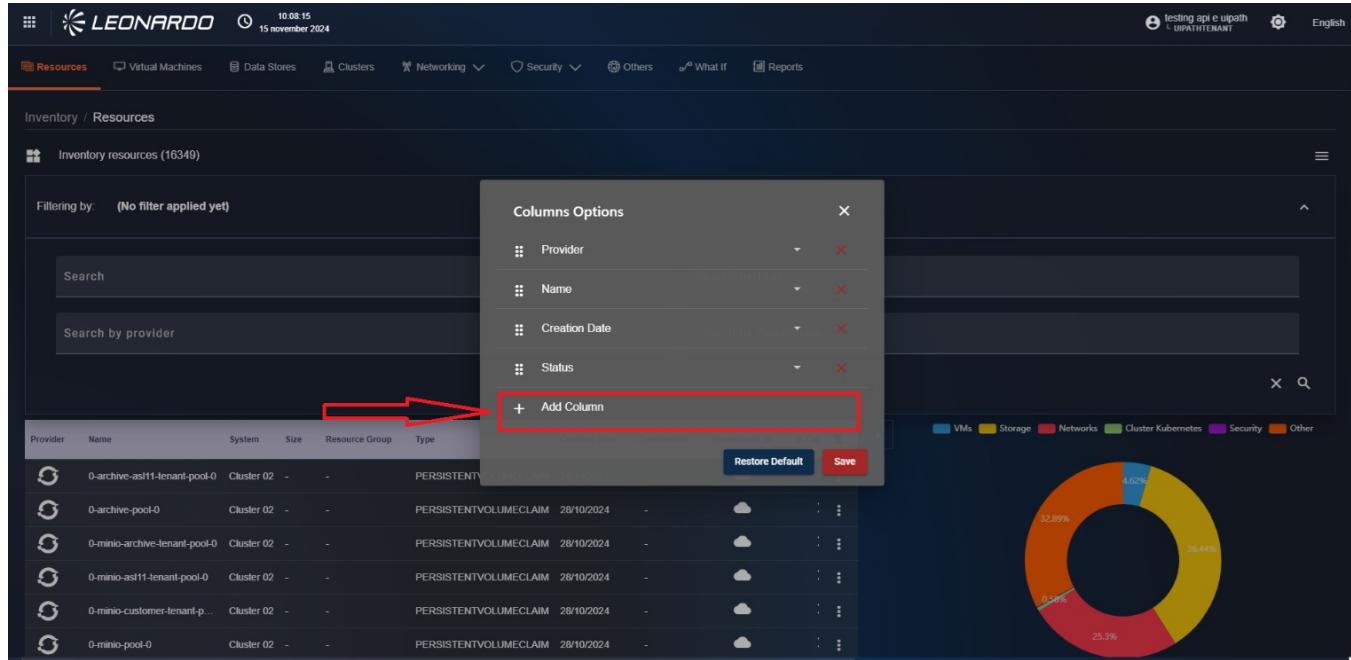
Figura 408 – Column Ordering

Additionally, it is possible to remove a field from the table by clicking on the red "X" corresponding to the field to be deleted; this will be removed from the list and, after saving, will also be removed from the table.

The screenshot shows the Leonardo Secure Cloud Management Platform interface. At the top, there is a header with the Leonardo logo, the date (15 November 2024), and some navigation links. Below the header, the main menu includes 'Resources', 'Virtual Machines', 'Data Stores', 'Clusters', 'Networking', 'Security', 'Others', 'What If', and 'Reports'. The 'Resources' tab is selected. On the left, there is a sidebar with 'Inventory / Resources' and a search bar. The main area displays a table of inventory resources with columns: Provider, Name, System, Size, Resource Group, and Type. The table contains several entries, such as '0-archive-ast11-tenant-pool-0' and '0-minio-archiver-tenant-pool-0'. To the right of the table, a modal window titled 'Columns Options' is open, listing four fields: Provider, Name, Creation Date, and Status. Each field has a red 'X' button to its right. A red arrow points to the 'Provider' field's 'X' button. Below the modal, there are buttons for 'Restore Default' and 'Save'. To the right of the table, there is a donut chart showing resource distribution across various categories: VMs, Storage, Networks, Cluster Kubernetes, Security, and Other. The chart indicates percentages for each category.

Figura 409 – Deleting Columns

If we want to add a field to the table, it will be necessary to click the "Add column" button; once pressed, it will be replaced by a "select" field which contains the list of all available fields not already present in the table.



The screenshot shows the Leonardo Secure Cloud Management Platform interface. The top navigation bar includes the Leonardo logo, date (15 November 2024), and time (10:08:15). The main menu has categories like Resources, Virtual Machines, Data Stores, Clusters, Networking, Security, Others, What If, and Reports. The current view is 'Inventory / Resources' with 16349 inventory resources. A search bar and provider search dropdown are present. A modal window titled 'Columns Options' lists columns: Provider, Name, Creation Date, and Status, each with a delete icon. At the bottom of this modal is a red-bordered button labeled '+ Add Column'. Below the modal is a table with columns: Provider, Name, System, Size, Resource Group, and Type. The table lists several entries, such as '0-archive-ash11-tenant-pool-0' and '0-minio-pool-0'. A 'Restore Default' and 'Save' button are at the bottom right of the modal. In the background, there's a pie chart showing resource distribution with segments for VMs, Storage, Networks, Cluster Kubernetes, Security, and Other.

Figura 410 – Adding new column

Select the field to add to the table from the displayed list and complete the application by clicking the save button available in the bottom right.

The page will automatically refresh to display the new table; furthermore, the configuration will be saved automatically and automatically retrieved upon login.

The screenshot shows the Leonardo Secure Cloud Management Platform's 'Resources' section. A modal window titled 'Columns Options' is open, displaying a list of columns: Provider, Name, Creation Date, Status, Size, and Type. The 'Type' column is highlighted with a red border. A red arrow points from the left towards the 'Save' button at the bottom right of the modal. Another red arrow points from the right towards the 'Resource Group' dropdown menu. The main table below shows various resources with columns for Provider, Name, System, Size, Resource Group, and Type. A donut chart on the right shows resource distribution across VMs, Storage, Networks, Cluster Kubernetes, Security, and Other categories.

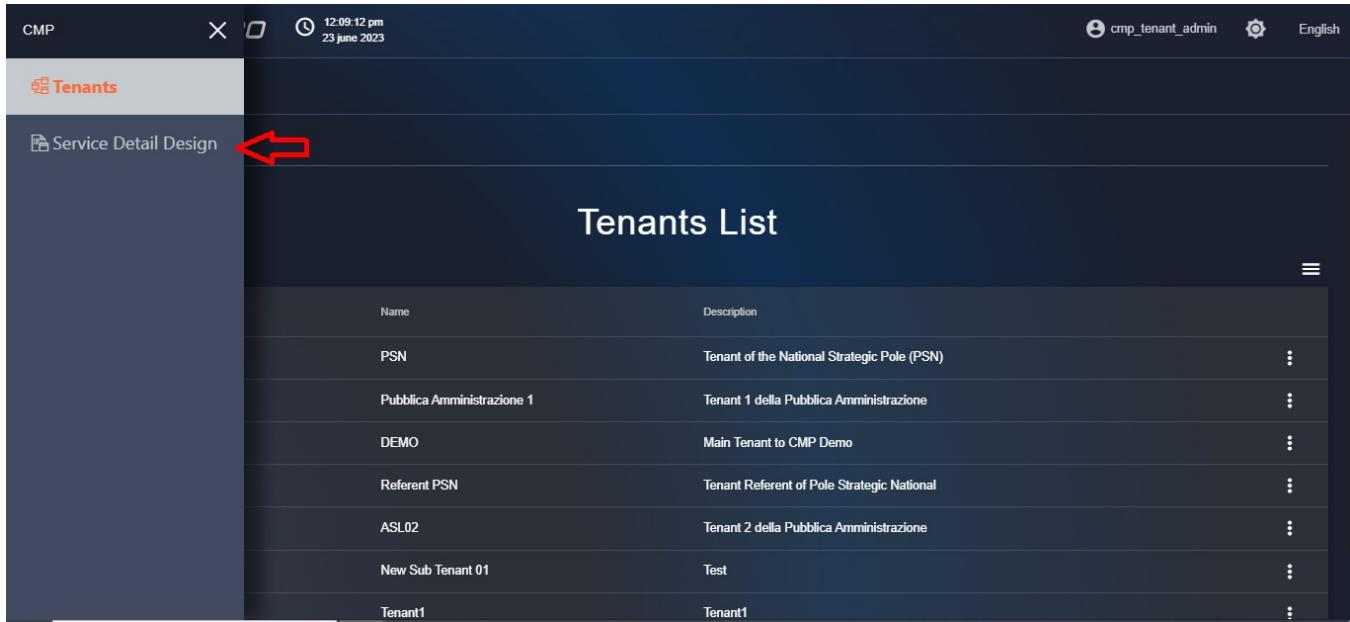
Figura 411 – Saving the view

Service Detail Design

The Service Detail Design service is the solution implemented for managing requests, which must then be processed within our environment by an authorized user.

To access Service Detail Design, log in to SCMP with the Service Manager user.

After logging in, click the "Service Detail Design" module from the bento button.



The screenshot shows the SCMP (Secure Cloud Management Platform) interface. The top navigation bar includes the logo, user information (14 Nov 2025, 08.00), and language selection (English). The left sidebar has a 'Tenants' section and a 'Service Detail Design' module, which is highlighted with a red arrow. The main content area is titled 'Tenants List' and displays a table of tenant information:

Name	Description	⋮
PSN	Tenant of the National Strategic Pole (PSN)	⋮
Pubblica Amministrazione 1	Tenant 1 della Pubblica Amministrazione	⋮
DEMO	Main Tenant to CMP Demo	⋮
Referent PSN	Tenant Referent of Pole Strategico Nazionale	⋮
ASL02	Tenant 2 della Pubblica Amministrazione	⋮
New Sub Tenant 01	Test	⋮
Tenant1	Tenant1	⋮

Figura 412 – Access to Service Detail Design module

The search page will be shown where it is possible to filter already created work orders based on:

- Status
- Customer
- Service Type
- Phase
- Creation Date

The table will show the general information of the Work Order.



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Order ID	Customer	Service Type	Creation Date	Last Update	Status	Phase	Actions
661c71a0bedf107659a55b75	840766	Servizi PSN	15/04/2024 00:15:28	15/04/2024 00:15:28	New	Deploy Service	▶ <input checked="" type="checkbox"/>
661cdd0bedf107659a55dae	840766	Servizi PSN	15/04/2024 07:57:36	15/04/2024 07:57:36	New	Deploy Service	▶ <input checked="" type="checkbox"/>
661dc31dbedf107659a55e77	840766	Servizi PSN	16/04/2024 00:15:25	16/04/2024 00:15:25	New	Deploy Service	▶ <input checked="" type="checkbox"/>
661f147cbef107659a560c0	840766	Servizi PSN	17/04/2024 00:14:52	17/04/2024 00:14:52	New	Deploy Service	▶ <input checked="" type="checkbox"/>
661fd4ac2941363637a859db	840766	Servizi PSN	17/04/2024 13:54:52	17/04/2024 13:54:52	New	Deploy Service	▶ <input checked="" type="checkbox"/>
662065cc2941363637a85ab1	840766	Servizi PSN	18/04/2024 00:14:36	18/04/2024 00:14:36	New	Deploy Service	▶ <input checked="" type="checkbox"/>

*Figura 413 – Service Detail Design
functionality filters*

Click the center of a work order row to view its content; a modal will open where we can expand the various sections by clicking on them.

To exit the detail view, click outside the gray window.



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The screenshot shows the Leonardo Work Orders application interface. At the top, there's a header with the Leonardo logo, the date (26 June 2023), and a timestamp (8:09:53 pm). The main navigation bar includes 'Work Orders' and 'Service Detail Design / Work Order'. A modal window titled 'Work Order Details' is open, displaying various details about a work order, such as Order ID, Order Title, Customer, Operator, Status, Created, Last Updated, and Service Type. Below the modal, there are sections for 'Technical Elements' (Client Data, Site Data, Documents) and 'Status History'. The status history table lists several entries with columns for Order ID, Order Title, Service Type, Status, and Last Update.

Order ID	Order Title	Service Type	Status	Last Update
6499bb4258ab7a35a1fb9446	IC_SPA_2021	Servizi Cloud	New	26/06/2023 16:22:36
6499bb4958ab7a35a1fb9448	IC_SPA_2021	Servizi Cloud	In progress	26/06/2023 16:31:47
6499bb4c58ab7a35a1fb9449	IC_SPA_2021	Servizi Cloud	Idle	26/06/2023 16:44:33
6499bd73aadc040a6e3ccb49	IC_SPA_2021	Servizi Cloud	In progress	26/06/2023 17:52:56
6499c071c90c991e9b78ae8	IC_SPA_2021	Servizi Cloud	New	26/06/2023 17:53:05

Figura 414 – Work Order Details

Work Order Flow

To take charge of a work order, click the "Play" symbol next to an order in "New" status.

A status change notification will be displayed on the screen, and the current status of the Order becomes "In progress"; the buttons of the corresponding order are modified:

- by clicking the “Pause” button, the order will transition to “Idle” status;
 - by clicking the “Mark as completed” button, it is possible to close the Work Order;
 - by clicking the “Rejected” button, it is possible to report the cancellation of the Order;



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Order ID	Customer	Service Type	Creation Date	Last Update	Status	Actions
6499bb4258ab7a35a1fb9446	IC_SPA_2021	Servizi Cloud	26/06/2023 16:22:26	26/06/2023 16:44:35	Completed	Completed
6499bb4958ab7a35a1fb9448	IC_SPA_2021	Servizi Cloud	26/06/2023 16:22:33	26/06/2023 16:22:33	Completed	Completed
6499bb4c58ab7a35a1fb9449	IC_SPA_2021	Servizi Cloud	26/06/2023 16:22:36	26/06/2023 16:23:20	Completed	Completed
6499bb4e58ab7a35a1fb944a	IC_SPA_2021	Servizi Cloud	26/06/2023 16:22:38	26/06/2023 16:22:38	New	New
6499bd73aad040a6e3bcb49	IC_SPA_2021	Servizi Cloud	26/06/2023 16:31:47	26/06/2023 16:31:47	In progress	In progress
6499c071c90c991e9b78aebe8	IC_SPA_2021	Servizi Cloud	26/06/2023 16:44:33	26/06/2023 16:44:33	Idle	Idle

Status updated successfully! OK

*Figura 415 – Work order management
page for Service Detail Design*

When the “Mark as completed” button is clicked, a window is displayed on the screen where information to be attached to the order can be entered, specifically:

- the result of the processing;
- a description of the chosen result;
- a note for the operator.



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The screenshot shows a user interface for managing work orders. On the left, there's a sidebar with filtering options like 'Order ID', 'Search by status' (New, In progress, Idle, Rejected), and 'Search by service type'. The main area displays a table of work orders with columns: Order ID, Status, Start Date, End Date, and Outcome. One row is selected, showing 'Service Cloud' as the status, '26/05/2023 16:22:29' as the start date, '26/05/2023 16:44:33' as the end date, and 'Completed' as the outcome. At the top, a modal window titled 'Close Order' is open, prompting the user to 'Select an outcome for this order' and providing a text field to 'Explain why you chosen this outcome'. A 'Finish' button is located at the bottom right of the modal.

Figura 416 – Closing a Work order

By scrolling down the page, we can find the parameters section where it is possible to enter different key/value combinations for the parameters used during processing.

After entering the key and value, click the “Plus” button to confirm the entry; new empty fields are added where additional parameters can be entered. To delete a key/value pair, click the “Minus” button; once all parameters have been entered, click the “Finish” button.



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KEY	VALUE	STATUS
IC_SPA_2021	Servizi Cloud	Completed
errorNumber	400	-
New Key	New Value	Completed
IC_SPA_2021	Servizi Cloud	In progress
IC_SPA_2021	Servizi Cloud	Rejected

Figura 417 – Parameter entry

After completing the order, it is possible, by opening the respective menus, to view all the information entered during processing within the info section.

Figura 418 – Information added during



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processing

15 Leonardo Services

Leonardo provides several managed services which are represented in the following figure by type (called service families).

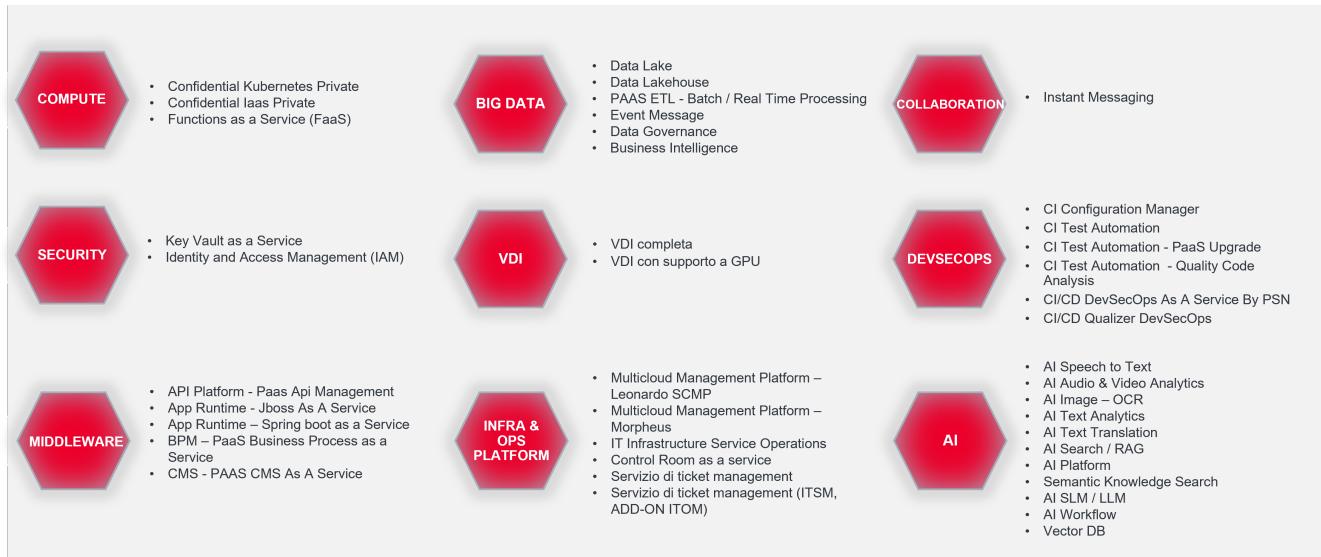


Figura 419 – Overview Leonardo Services

From a logical-functional point of view, the services can be divided into three macro-categories:

- Infrastructure as a Service (IaaS) Services
- Container as a Service (CaaS) Services
- Platform as a Service (PaaS) Services

The IaaS and CaaS categories include some services from the "Compute" family. The PaaS category includes services from all other families.

The aforementioned macro-categories will be described below.

15.1 Infrastructure as a Service (IaaS) Services

In the following table, you can consult the services pertaining to the Infrastructure as a Service (IaaS) category.

FAMILY	SUB-FAMILY	SERVICE NOMENCLATURE



FAMILY	SUB-FAMILY	SERVICE NOMENCLATURE
Compute	Confidential - IaaS - Private	- Pool Small (Confidential) - Pool Medium (Confidential) - Pool Large (Confidential) - Pool X-Large (Confidential)

15.1.1 Compute

Below are the sub-families pertaining to the Compute family: - Confidential - IaaS - Private

15.1.1.1 Confidential - IaaS - Private

Below is the list of services pertaining to the Confidential - IaaS - Private sub-family:

- Pool Small (Confidential)
- Pool Medium (Confidential)
- Pool Large (Confidential)
- Pool X-Large (Confidential)

"Service Description"

The services allow for the provision of virtual computational environments (IaaS) of Private type, i.e., on a pool of physical resources, dedicated and isolated for each individual client, based on the use of "bare metal" compute instances. The data of the physical resources are encrypted and kept protected in all phases of their use (At-Rest, In-transit & In-use), leveraging the Confidential Computing paradigm. Depending on the pool of computational resources required for each individual Administration, it is possible to choose the most suitable service from the four available types.

"Service Features and Benefits"

Private Cloud resources are exclusively dedicated to each client. The services use secure Enclaves based on Trusted Execution Environment (TEE) leveraging HW Confidential, which offer an advanced level of security for data in use, protecting them during processing. They support advanced data encryption at Rest, in Transit & in Use. They use advanced Remote Attestation systems to verify the correctness of the TEE environment, isolating the memory of virtual machines from the host operating system and other malicious guests.

The advantages offered by the services are:

- Security and confidentiality of data in dedicated environments;
- Workload isolation through advanced virtualization;
- Dedicated firewalls and network micro-segmentation;



- Automated provisioning and rapid resource management;
- Total control and centralized governance: centralized monitoring and auditing for traceability.

15.2 Container as a Service (CaaS) Services

In the following table, you can consult the services pertaining to the Container as a Service (CaaS) category.

FAMILY	SUB-FAMILY	SERVICE NOMENCLATURE
Compute	Confidential - Kubernetes - Private	Kubernetes Confidential Computing

15.2.1 Compute

Below are the sub-families pertaining to the Compute family: - Confidential - Kubernetes - Private

15.2.1.1 Confidential - Kubernetes - Private

Below is the list of services pertaining to the Confidential - IaaS - Private sub-family:

- Kubernetes Confidential Computing

"Service Description" Service that allows the provision of a platform for the orchestration of private and secure containers, designed to manage containerized applications in highly regulated environments or with confidentiality requirements. It offers a secure and controlled Kubernetes environment where the security component is one of the main aspects of the solution. The operating system on which the solution is based is hardened, to minimize the attack surface and potential vulnerabilities. Within the architectural components of the solution, mechanisms are used to ensure data security even during communication phases (through encryption mechanisms applied by default to communications between platform components) and for data stored within the platform itself. The platform can be customized to adapt to the specific needs of each Organization, ensuring integration with existing corporate systems and applications.

"Service Features and Benefits" Its implementation requires a combination of hardware certified for Confidential Computing, a security-hardened private Kubernetes infrastructure, and a set of observability and governance tools to maintain total control over the container lifecycle. Included functionalities:

- *Data protection* → the operating system is configured to ensure protection in all its phases: data in memory, through full disk encryption and key rotation; data in transit, using secure and encrypted communication protocols; data in use, adopting Confidential Computing practices and secure execution environments.
- *Secure Enclaves* → apply isolation and encryption, ensuring that only authorized parties can access the data.
- *Trusted Execution Environments (TEE)* → add a secure processing environment, protecting data from external



threats.

Being a managed Kubernetes solution, the client will not have to deal with infrastructure management and its complexity, as the infrastructural layer is managed by Leonardo throughout the service lifecycle.

The advantages offered are:

- Security and confidentiality of containerized applications: end-to-end encryption, confidential computing for workloads, container isolation on dedicated nodes with hardware-based protection, integrated security policies, and advanced RBAC;
- Centralized control and governance of clusters;
- Scalability and flexibility;
- Integration with multicloud and legacy environments.

15.3 Platform as a Service (PaaS) Services

In the following table, you can consult the services pertaining to the Platform as a Service (PaaS) category.

FAMILY	SUB-FAMILY	SERVICE NOMENCLATURE
Compute	FAAS	Functions as a Service
Security	IAM	Identity & Access Management Service
Security	Key Management	Key Vault as a Service
Middleware	API Platform	PaaS API Management
Middleware	APP Runtime	Jboss as a Service
Middleware	APP Runtime	Spring boot as a Service
Middleware	BPM	PaaS Business Process as a Service
Middleware	CMS	PaaS CMS as a Service
Middleware	ETL	PaaS ETL - Batch / Real Time Processing - 1 worker
Infra & Ops Platform	Multicloud Management	Multicloud Management Platform-Leonardo SCMP
Infra & Ops Platform	Multicloud Management	Multicloud Management Platform-Morpheus



FAMILY	SUB-FAMILY	SERVICE NOMENCLATURE
Infra & Ops Platform	Observability-Infra	Control Room as Service
Infra & Ops Platform	Observability-Infra	IT infrastructure Service Operations (Logging & Monitoring)
Infra & Ops Platform	TTM	PaaS Ticket Management Service
Infra & Ops Platform	TTM	PaaS Ticket Management Service (ITSM)
Infra & Ops Platform	TTM	PaaS Ticket Management Service (ADD-ON ITOM)
DevSecOps	CI	Configuration Manager
DevSecOps	CI	Test Automation
DevSecOps	CI	Quality Code Analysis
DevSecOps	CI/CD	DevSecOps As A Service By PSN
DevSecOps	CI/CD	Qualizer DevSecOps
Big Data	Data Lake	Data Lake - 1TB
Big Data	Data Lakehouse	Data Lakehouse
Big Data	Business Intelligence	Business Intelligence
Big Data	ETL	Batch/Real time Processing - 1 Worker
Big Data	Event Platform	Event Message
Big Data	Data Governance	Data Governance
AI	AI - Audio & Conversations	Speech to Text
AI	AI - Image	OCR
AI	AI - Text	AI Search - AI Search - RAG - 10 GB - 1 worker
AI	AI - Text	Text Analytics
AI	AI - Text	Translation
AI	AI - Generative	AI SLM/LLM



FAMILY	SUB-FAMILY	SERVICE NOMENCLATURE
AI	AI - Tools	AI workflow
AI	AI - Tools	Vector DB
AI	AI - Tools	AI Platform
VDI	Virtual Desktop	VDI
VDI	Virtual Desktop	VDI with GPU Support
Collaboration	Communication	Instant Messaging

15.3.1 Compute

Below are the sub-families pertaining to the Compute family: - FAAS

15.3.1.1 FAAS

Below is the list of services pertaining to the FAAS sub-family:

- Functions as a Service

"Service Description"

FaaS (Function as a Service) is a system design model, event-driven, executed on stateless containers, where developers create, deploy, and run small, independent functions to perform specific tasks without worrying about the underlying infrastructure. The adoption of FaaS allows for the standardization of application development and execution, centralizing cross-functional capabilities such as orchestration, automatic provisioning, monitoring, integrated service management, and event-driven flow control. It offers tools for:

- centrally manage serverless functions;
- automate component lifecycle management;
- enable multi-cloud and hybrid cloud portability;
- support innovation with GPU runtimes and dedicated AI tools. The FaaS platform provides and scales underlying resources based on demand. It is ideal for highly dynamic scenarios, with variable workloads, and integrates seamlessly with microservices and event-driven architectures.

"Service Features and Benefits" The service is not limited to providing an execution engine, but offers a complete ecosystem, composed of:

- *Serverless execution* → stateless functions and event-driven workflows, scalable and available in various



programming languages.

- *Portability and independence* → executable on any Kubernetes cluster, multi-environment, without lock-in constraints.
- *Security and compliance* → data protection and centralized access management.
- The solution allows organizations to adopt a modern and flexible model, reducing operational complexity and benefiting from a standardized and easily accessible service.

The service is delivered via Apache OpenServerless, an open-source, cloud-agnostic serverless platform based on Apache OpenWhisk as a Function-as-a-Service (FaaS) engine.

The advantages offered are:

- *Reduction of operating costs* → you only pay for the actual use of the functions;
- *Flexibility and scalability* → resources adapt to demand;
- *Operational efficiency* → elimination of direct server management, patching, and updates;
- *High availability* → integrated redundancy and fault tolerance, ensuring high availability of functions even in the event of hardware failures or other interruptions;
- *Accelerated time-to-market* → rapid release of new functionalities without worrying about the infrastructure;
- *Development agility* → focus on code and business logic, not on server management;
- *Continuous innovation* → rapid experimentation with new low-cost services;
- *Competitive advantage* in cost and speed compared to traditional hosting models.

16 ☁ REST API