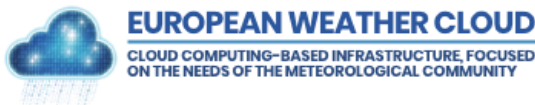


EWC Tools and Resources

ECMWF & EUMETSAT

Roberto Cuccu, Francesco Murdaca

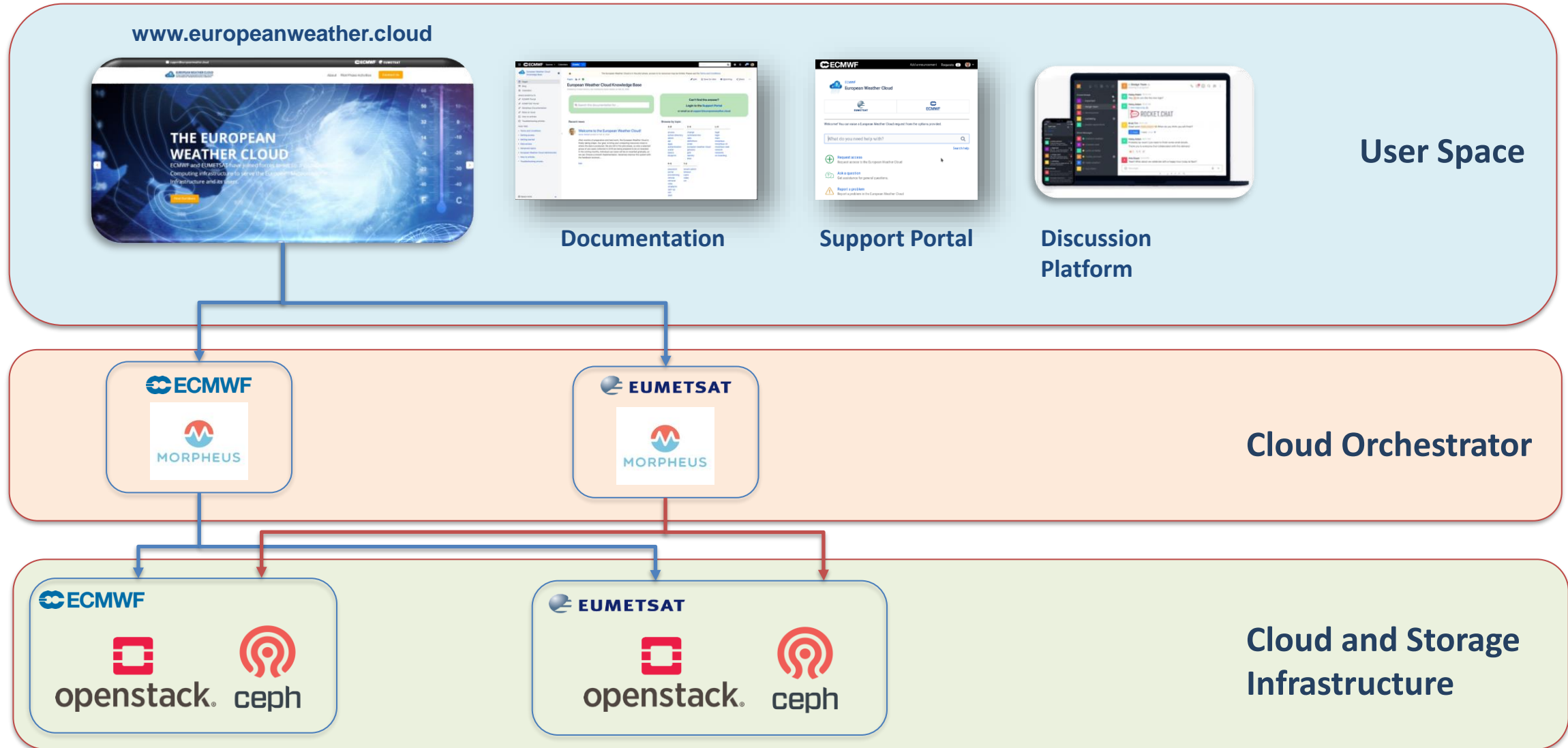
26th September 2023, European Weather Cloud (EWC) User Workshop 2023



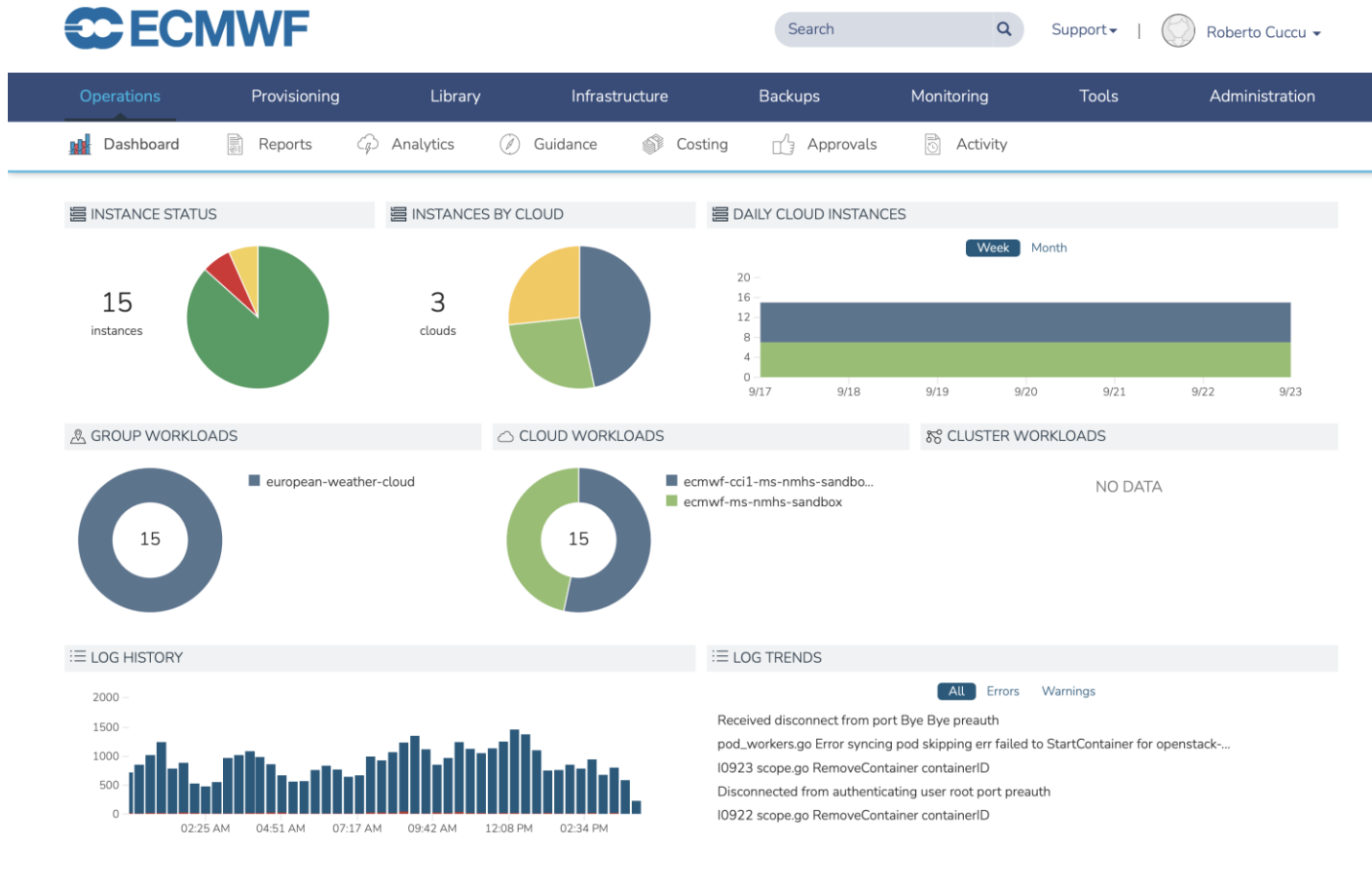
Agenda

- ❖ **Morpheus – Cloud Management Platform**
- ❖ **Knowledge Base**
- ❖ **Accounting System**
- ❖ **Discussion Platform**
- ❖ **Features Roadmap and Software Marketplace**

High Level Design



Morpheus



Morpheus is a cloud management platform able to control multiple cloud infrastructure.

Each project with access to the European Weather Cloud is called a **Tenant**.

Each partner in the EWC makes available their infrastructure to the users which is seen as a **Cloud** in Morpheus.

Virtual Machines provisioning

Provisioning-> Instances -> +ADD

ECMWF

Search | Support | Demo User

Operations Provisioning Library Infrastructure Backups Monitoring Tools Administration

Instances Instances Apps

INSTANCE COUNT: 1

INSTANCE STATUS: Running 1, Stopped 0

MAX CPU: 0% | STORAGE: 4% | MEMORY: 10%

INSTANCES

Search | All Groups | All Clouds | All Statuses | **+ ADD** | ACTIONS | Settings

NAME	SUMMARY	LOCATION	STATS
------	---------	----------	-------

Virtual Machines provisioning

The dashboard features the ECMWF logo and navigation tabs for Operations, Provisioning, Library, Infrastructure, and Backups. Under Provisioning, there are buttons for Instances and Apps. A line graph shows the instance count at 1. A table displays instance status: Running (1) and Stopped (0). A circular gauge shows 0% MAX CP. Below, an INSTANCES table has filters for search, groups, clouds, and statuses, and a '+ ADD' button.

NAME	SUMMARY	LOCATION	STATS
------	---------	----------	-------

Instance Type selection

The 'CREATE INSTANCE' dialog shows a progress bar with steps: GROUP, CONFIGURE, AUTOMATION, REVIEW. A search bar is present. Two instance types are listed: ROCKY (Rocky Linux) and UBUNTU (Ubuntu). A red box highlights the '+ ADD' button in the main dashboard, which is linked to this dialog.

Virtual Machines provisioning

CREATE INSTANCE

AUTOMATION REVIEW

Configuration Options

VERSION 8.8

LAYOUT rocky-8.8-generic

PLAN 2cpu-4gbmem-30gbdisk
Cores: 2 Memory: 4 GB

RESOURCE POOL cci1-ewcloud-ms-nmhs-sandbox

VOLUMES 30 GB Volume Auto - Datastore +
data-1 100 GB Auto - Datastore

NETWORKS private-cci1-ewcloud-ms-nmhs-san DHCP +

AVAILABILITY ZONE nova

SECURITY GROUP ssh-https

SERVER GROUP (AFFINITY) Select

FLOATING IP external-internet

Instance configuration options:

- Layout
- Plan
- Volumes
- Networks (public and/or private)
- Security Group
- Floating IP

Virtual Machines provisioning

CREATE INSTANCE

AUTOMATION REVIEW

Configuration Options

VERSION: 8.8

LAYOUT: rocky-8.8-generic

PLAN: 2cpu-4gbmem-30gbdisk
Cores: 2 Memory: 4 GB

RESOURCE POOL: cci1-ewcloud-ms-nmhs-sandbox

VOLUMES: 30 GB Volume
data-1 100

NETWORKS: private-cci1-ewcloud-ms-nmhs-san DHCP

AVAILABILITY ZONE: nova

SECURITY GROUP: ssh-https

SERVER GROUP (AFFINITY): Select

FLOATING IP: external-internet

ECMWF

Search | Support | Demo User

Operations Provisioning Library Infrastructure Backups Monitoring Tools Administration

Instances Apps

INSTANCE COUNT: 1

INSTANCE STATUS: Running 1, Stopped 0

MAX CPU: 0% STORAGE: 4% MEMORY: 9%

INSTANCES

Search | All Groups | All Clouds | All Statuses | + ADD | ACTIONS | Settings

NAME	SUMMARY	LOCATION	STATUS	HEALTH	MAX CPU	MEMORY	STORAGE
<input type="checkbox"/> my-new-vm Test	IP addr: 136.156.132.135 Version: 8.8 Virtual Machines: 1	Group: european-weather-cloud Clouds: ecmwf-cci1-ms-nmhs-sandbox			0	9	1

Library -> Integrations

The screenshot shows the ECMWF Library Integrations page. At the top, there is a navigation bar with tabs for Operations, Provisioning, Library (selected), Infrastructure, Backups, Monitoring, Tools, and Administration. Below this is a sub-navigation bar with icons for Automation, Blueprints, Options, Templates, and Integrations. The main content area shows the 'ansibletasks' integration, which is marked with a green checkmark. It includes an 'ANSIBLE' logo and buttons for 'EDIT' and 'DELETE'. Below this, there is a section for 'ANSIBLETASKS' with a '#MASTER' branch and an 'ACTIONS' dropdown. A search bar contains the text 'ansible' and a 'RUN' button. At the bottom, there are tabs for 'Plays', 'Roles', 'Inventory', and 'History'. The 'PLAYS' section lists various YAML files such as 'disk_volume_mount.yml', 'freeipa-client-enroll.yml', 'k8s-cert-fix.yml', 'nvidia-driver.yml', 'nwp-nm-training.yml', 'rdtraining.yml', 'dump_morpheus_vars.yml', 'freeipa-server-apply-defaults.yml', 'k8s-octavia.yml', 'nwp-da-training.yml', 'nwp-pa-training.yml', 's3clients.yml', 'ecmwf-stack.yml', 'install-freeipa-server.yml', 'mount-nfs.yml', 'nwp-ho-training.yml', 'nwp-pr-training.yml', 'traininglab_copy_file.yml', 'escape2.yml', 'jupyterlab.yml', 'nfs-server.yml', 'nwp-ml-training.yml', 'passwordless-sudo.yml', and 'x2go.yml'.

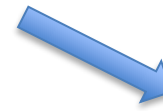
Automation Integrations can be added to enable the use of configuration management tools, e.g. Ansible



Library -> Blueprints

The screenshot shows the ECMWF Library interface. The top navigation bar includes 'Operations', 'Provisioning', 'Library', 'Infrastructure', 'Backups', 'Monitoring', 'Tools', and 'Administration'. The 'Library' tab is active, showing a search bar, a filter for 'Technology: openstack', and a table of Instance Types. A dropdown menu is open over the 'Blueprints' link, showing options like 'Automation', 'Options', 'Templates', and 'Integrations'.

TYPE	NAME	TECHNOLOGY	LABELS	FEATURED	SYSTEM
	CentOS	Openstack		✓	
	Dask Scheduler	Openstack			
	Dask Worker	Openstack			
	F5	Openstack			
	FreeIPA Server	Openstack			
	Rocky	Openstack		✓	
	Ubuntu	Openstack		✓	
	WireGuard VPN Server	Openstack			



The screenshot shows the 'CREATE INSTANCE' page with tabs for 'GROUP', 'CONFIGURE', 'AUTOMATION', and 'REVIEW'. The 'AUTOMATION' tab is active, displaying a list of Instance Types and Layouts. The list includes DASK WORKER, FREEIPA SERVER, ROCKY, UBUNTU, and WIREGUARD VPN SERVER, each with a brief description and a 'PREVIOUS' or 'NEXT' button at the bottom.

Instance Types and Layouts

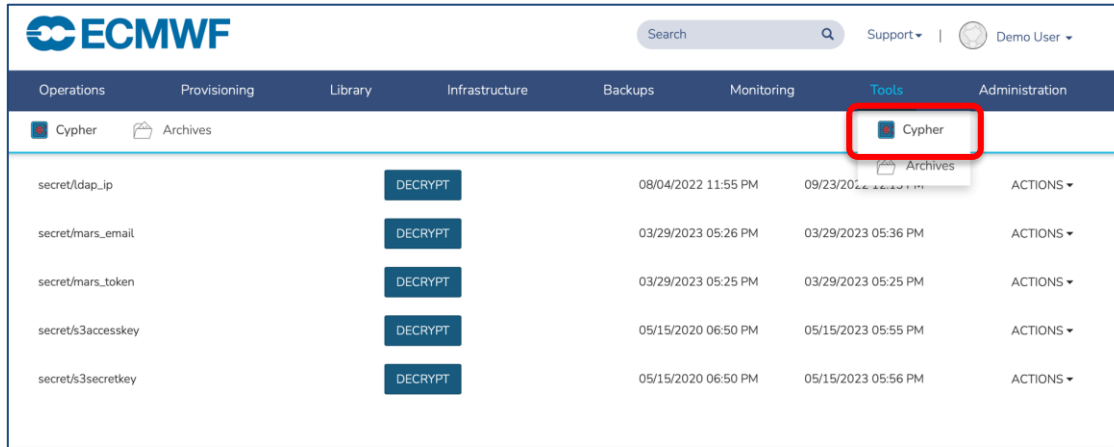
The screenshot shows the 'NEW BLUEPRINT' page with tabs for 'Builder', 'Raw', and 'Preview'. The 'Builder' tab is active, displaying a 'STRUCTURE' panel on the left and a 'CONFIGURATION' panel on the right. The 'STRUCTURE' panel shows a tree view of components like App, Environment, Database, and Web. The 'CONFIGURATION' panel shows fields for NAME, DESCRIPTION, CATEGORY, LABELS, IMAGE, and DARK IMAGE.

App Blueprints

Blueprints feature together with automation tools allow the setup of reproducible application environment for their flexible on-demand deployment.

Cypher – Secrets management

Tools -> Cypher



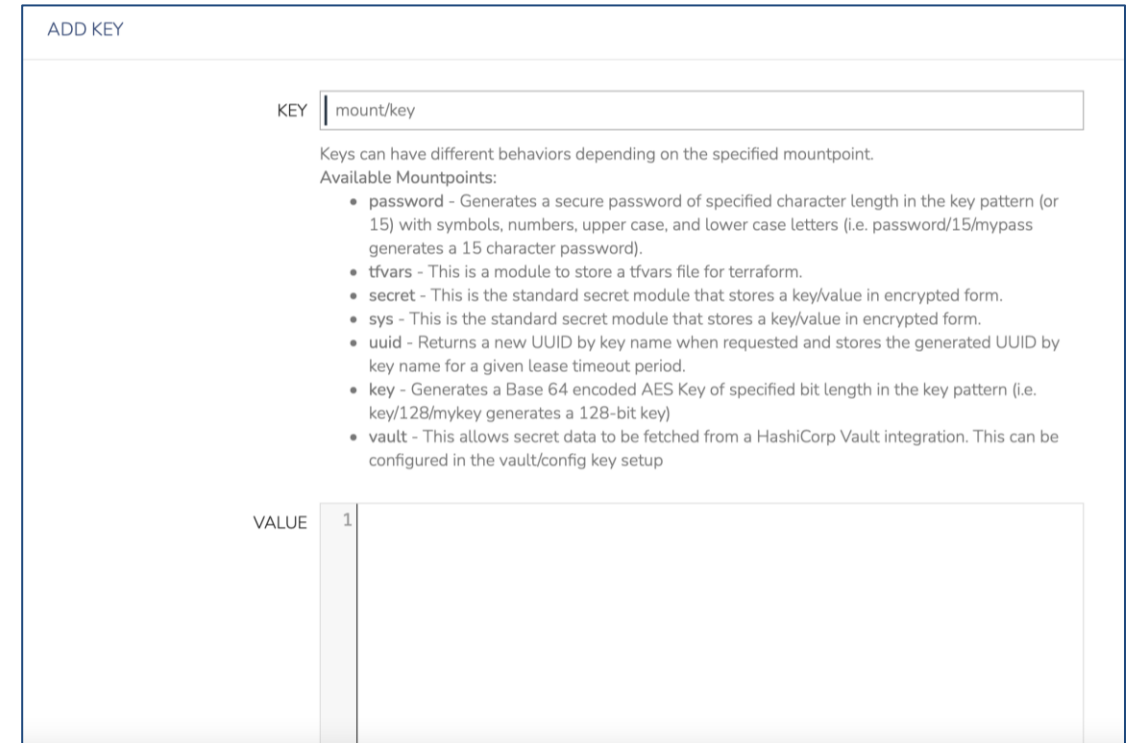
The screenshot shows the ECMWF user interface. At the top, there is a search bar and a user profile for 'Demo User'. Below the navigation bar, the 'Tools' menu is open, and 'Cypher' is highlighted with a red box. The main content area displays a table of secrets with columns for name, actions, and dates.

secret/ldap_ip	DECRYPT	08/04/2022 11:55 PM	09/23/2022 05:56 PM	ACTIONS ▾
secret/mars_email	DECRYPT	03/29/2023 05:26 PM	03/29/2023 05:36 PM	ACTIONS ▾
secret/mars_token	DECRYPT	03/29/2023 05:25 PM	03/29/2023 05:25 PM	ACTIONS ▾
secret/s3accesskey	DECRYPT	05/15/2020 06:50 PM	05/15/2023 05:55 PM	ACTIONS ▾
secret/s3secretkey	DECRYPT	05/15/2020 06:50 PM	05/15/2023 05:56 PM	ACTIONS ▾

Morpheus Cypher is a built-in functionality to store sensitive information, e.g. to store secrets like passwords or API keys.

The feature is integrated with the Automation tools and it is possible to access stored secrets programmatically e.g. via shell scripts or Ansible tasks.

Stored secrets can be revoked either manually or automatically after a timeout.



The screenshot shows the 'ADD KEY' form. It has a 'KEY' field with the value 'mount/key'. Below the field, there is a list of 'Available Mountpoints' with a bulleted list of options: password, tfvars, secret, sys, uuid, key, and vault. Each option has a brief description of its behavior. At the bottom, there is a 'VALUE' field with a '1' in a small box next to it.

ADD KEY

KEY

Keys can have different behaviors depending on the specified mountpoint.

Available Mountpoints:

- password - Generates a secure password of specified character length in the key pattern (or 15) with symbols, numbers, upper case, and lower case letters (i.e. password/15/mypass generates a 15 character password).
- tfvars - This is a module to store a tfvars file for terraform.
- secret - This is the standard secret module that stores a key/value in encrypted form.
- sys - This is the standard secret module that stores a key/value in encrypted form.
- uuid - Returns a new UUID by key name when requested and stores the generated UUID by key name for a given lease timeout period.
- key - Generates a Base 64 encoded AES Key of specified bit length in the key pattern (i.e. key/128/mykey generates a 128-bit key)
- vault - This allows secret data to be fetched from a HashiCorp Vault integration. This can be configured in the vault/config key setup

VALUE

Automation - Morpheus CLI and APIs

CLI

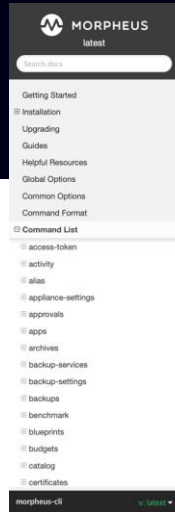
```
~$ morpheus instances list

Morpheus Instances
=====
ID | NAME | GROUP | CLOUD | TYPE | VERSION
-----|-----|-----|-----|-----|-----
5382 | my-new-vm | european-weather-cloud | ecmwf-ccii-ms-nmhs-sandbox | Rocky | 8.8

Viewing 1-1 of 1

~$
~$ morpheus instances stats my-new-vm

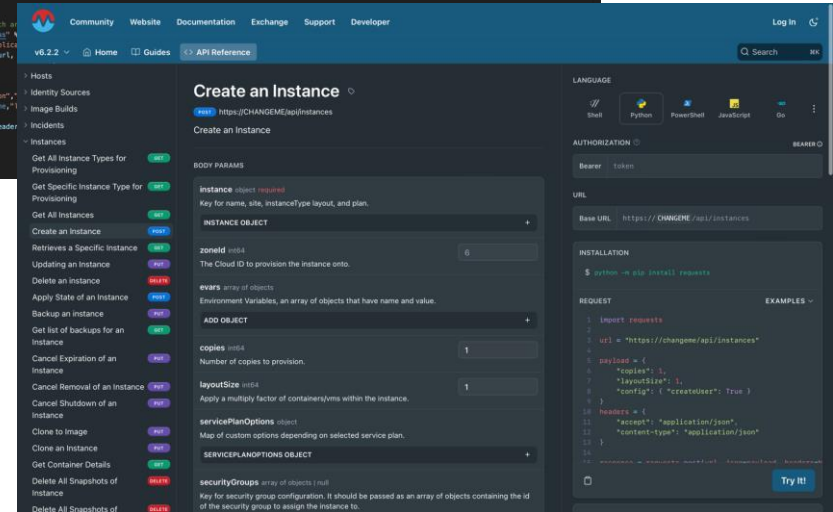
Instance Stats: my-new-vm (Rocky)
=====
Status: RUNNING
Nodes: 1
CPU: [ ]
Memory: [ ]
Storage: [ ]
```



```
Instances list
User: morpheus Instances list
-j, --group GROUP Group Name or ID
-c, --cloud CLOUD Cloud Name or ID
-h, --host HOST Host Name or ID
-u, --user USER User Username or ID
-a, --agent AGENT Show only instances with the agent installed
-s, --status STATUS Filter by status i.e., provisioning, running, starting, stopping
-t, --type TYPE Filter by Instance Type code
-e, --environment ENVIRONMENT Filter by Environment code(s)
-r, --pending-removal Filter by pending removal. Only instances pending removal.
-o, --pending-removal-only Filter by pending removal. Only instances pending removal.
-p, --plan NAME Filter by Plan name(s)
-i, --plan-id ID Filter by Plan ID(s)
-l, --plan-code CODE Filter by Plan code(s)
-L, --label LABEL Filter by labels, can match any of the values
-l, --label LABEL Filter by labels, must match all of the values
-t, --tags NAME=VALUE Filter by tags (metadata name value pairs). Display values for memory and storage usage used / max values.
-d, --details DETAILS Display all details: plan, status, etc
-m, --max MAX Max Results (use -1 for all results)
-o, --offset OFFSET Offset Results
-s, --search PHRASE Search Phrase
-i, --invert INVERT Sort Order, DIRECTION may be included as "ORDER [asc|desc]". Descending sort direction. Reverse order of results. This invert is done by the client, not necessarily the entire data.
-q, --query PARAMS Query parameters. PARAMS format is 'foo=bar&category=web'
-j, --json JSON JSON Output
-y, --yaml YAML YAML Output
-o, --csv CSV CSV Output
-w, --wrap WRAP Wrap CSV values with ". Default: false
-H, --no-header NO-HEADER Exclude header for CSV Output.
-f, --fields FIELDS Filter output to a limited set of fields. Default is all fields for json,csv,yaml.
-a, --all-fields ALL-FIELDS Show all fields present in the data.
-m, --merge MERGE Merge table columns instead hiding them when terminal is not wide enough.
-s, --select X,Y,Z Filter output to just print the value(s) of specific fields.
-l, --delimiter DELIMITER Delimiter for output values. Default: ','; use with --select and --csv
-l, --delimiter DELIMITER Delimiter for output rows. Default: '\n'; use with --select and --csv
-n, --quiet QUIET No Output, do not print to stdout
-p, --print PRINT Print the API request instead of executing it.
-c, --curl CURL Curl, print the API request as a curl command instead of executing it.
-r, --remote REMOTE Remote URL, this allows some requests instead of using a configured remote.
-t, --token TOKEN Access token for authentication with --remote. Saved credentials are used by default.
-u, --username USERNAME Username for authentication.
-p, --password PASSWORD Password for authentication.
-i, --insecure INSECURE Allow insecure HTTPS communication. i.e. bad SSL certificate.
-c, --color COLOR Disable ANSI coloring
-b, --benchmark BENCHMARK Print benchmark time and exit/error after the command is finished.
-v, --debug DEBUG Print extra output for debugging.
```

REST APIs

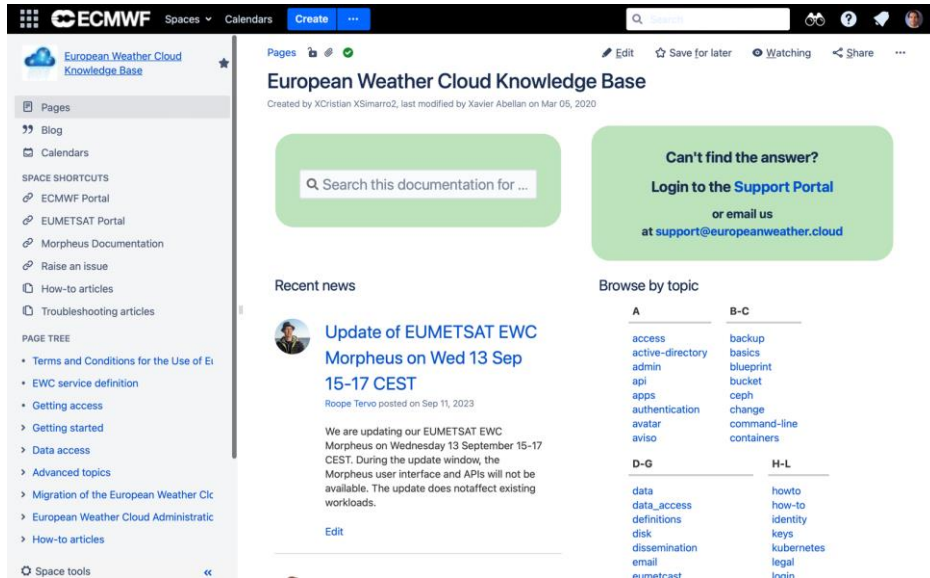
```
tenant > morpheus instances list
tenant > morpheus instances stats my-new-vm
tenant > morpheus instances create my-new-vm
tenant > morpheus instances delete my-new-vm
```



EUROPEAN WEATHER CLOUD
CLOUD COMPUTING-BASED INFRASTRUCTURE, FOCUSED
ON THE NEEDS OF THE METEOROLOGICAL COMMUNITY



Knowledge Base



<https://confluence.ecmwf.int/x/6J83Cg>



KB Content



- Terms and Conditions
- Getting access
- Getting started
- Data access
- Advanced topics
- How-to articles
- Troubleshooting articles
- Discussion platform



Blog Posts

Support Portal

The screenshot shows the ECMWF user interface. At the top, there is a navigation bar with the ECMWF logo and a search bar. Below the navigation bar, there are several tabs: Operations, Provisioning, Library, Infrastructure, Back, and Administration. The 'SUPPORT PORTAL - EUROPEAN WEATHER CLOUD' option is highlighted with a red box, and a red arrow points from it to the right. Below the navigation bar, there is a 'FAVORITES' section with a table of instances. The table has columns for INSTANCE, TYPE, and ADDRESS. The first row shows 'my-new-vm' as the instance name, 'Rocky' as the type, and '136.156.132.135' as the address. Below the table, there are three charts: 'INSTANCE STATUS' showing 1 instance, 'INSTANCES BY CLOUD' showing 1 cloud, and 'DAILY CLOUD INSTANCES' showing a line graph for the week of 9/19 to 9/25.

The screenshot shows the ECMWF European Weather Cloud support portal. At the top, there is the ECMWF logo and the text 'European Weather Cloud'. Below the logo, there are two logos: EUMETSAT and ECMWF. Below the logos, there is a welcome message: 'Welcome! You can raise a European Weather Cloud request from the options provided.' Below the welcome message, there is a search bar with the text 'What do you need help with?' and a search icon. Below the search bar, there is a 'Search help' link. Below the search bar, there are three categories of help: 'General question' (Get assistance for general questions), 'Request access' (Request access to the European Weather Cloud), and 'Report a problem' (Report a problem in the European Weather Cloud).

<https://jira.ecmwf.int/servicedesk/customer/portal/9>



EWC Accounting

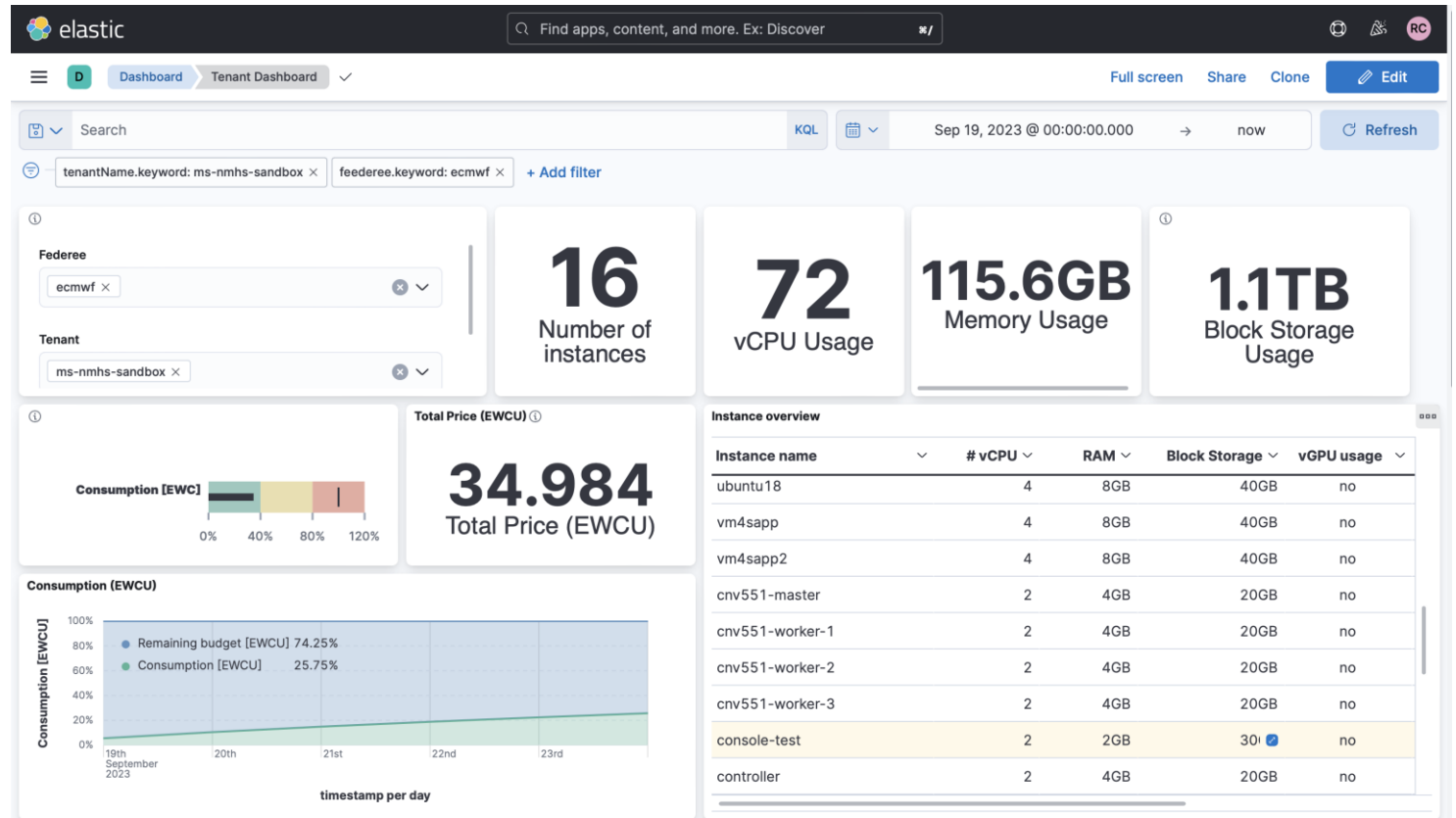
The **Accounting service** provides a cross-cloud overview of resource usage of the tenancies.

A web GUI provides metrics, time series, graphs, and dashboards displaying the accounting information.

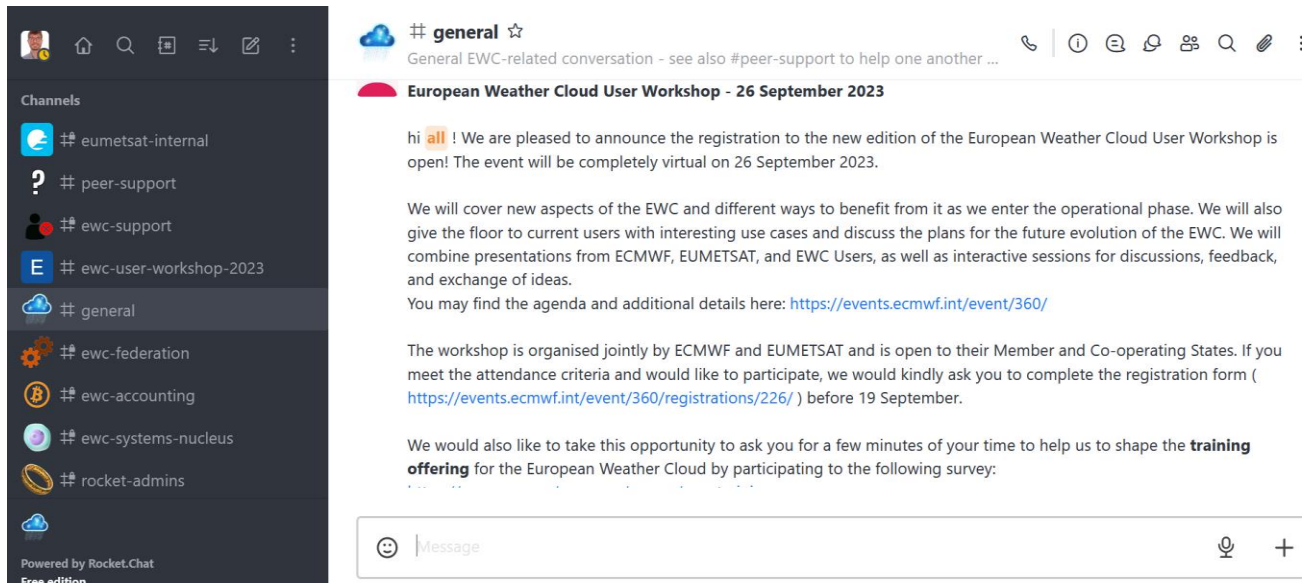
Accounted resources include:

- Virtual Machines
 - vCPU
 - Memory
 - Local Disks
- Object Storage (S3)
- vGPU usage

A billing **unit** is adopted as virtual currency for the accounting of the consumed cloud resources.



EWC Discussion Platform: Rocketchat



Rocketchat

Customizable communication platform hosted on EWC

Secure and compliant to standards (e.g. E2E encryption, GDPR)

Open Source

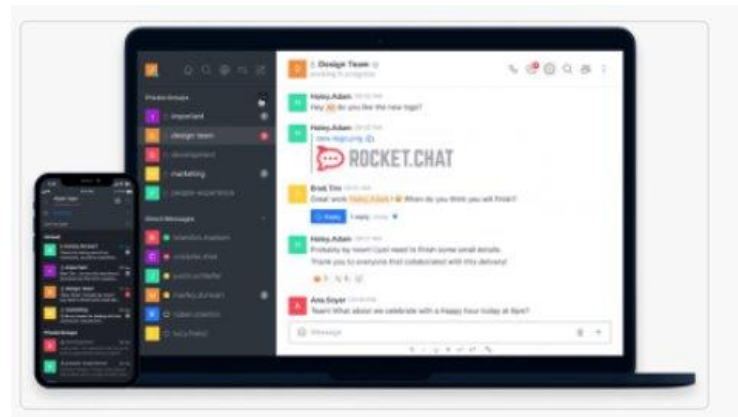
Unlimited history of discussion

Not an official support tool!! -> JIRA ticket or support email

It's a pilot -> review process in place

Installation

- Web based
- Desktop App
- Mobile



EWC Discussion Platform: Rocketchat

How do I join?

All Member States developers can self-register (based on email domain):

<https://chat.europeanweather.cloud>

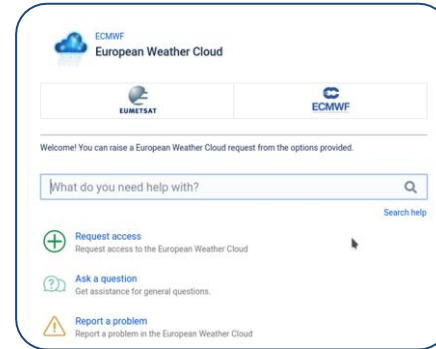
External users can't self-register but can be invited. They need to be accepted by admins.

What channels are featured?	What Can I do here?
#general	Learn about any news, updates from EWC community Share interesting article/topics for the community Discuss tools/solution you are using that could benefit the community
#peer-support	#community-support channel, if you are encountering issues with any tools or need recommendations on some technology or solution, you can ask the community
#random	#off-topic channel to share pictures, meme, anything to chill with the community

Feedback

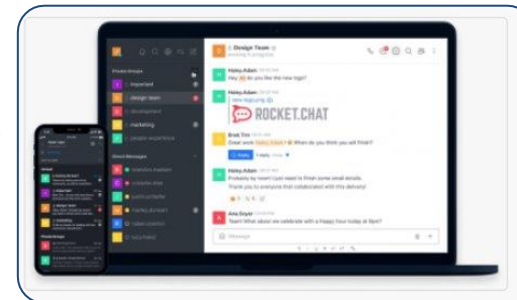


Get in contact for feedback or contributions ...



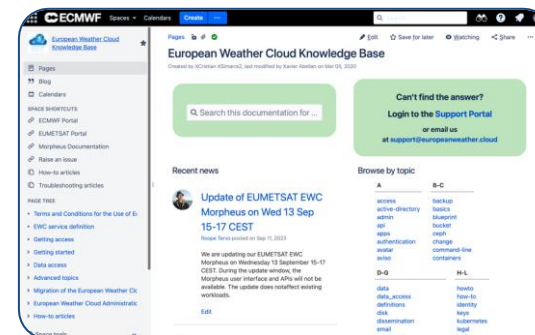
... via **Support Portal**
(<https://jira.ecmwf.int/plugins/servlet/desk/portal/9>)

or



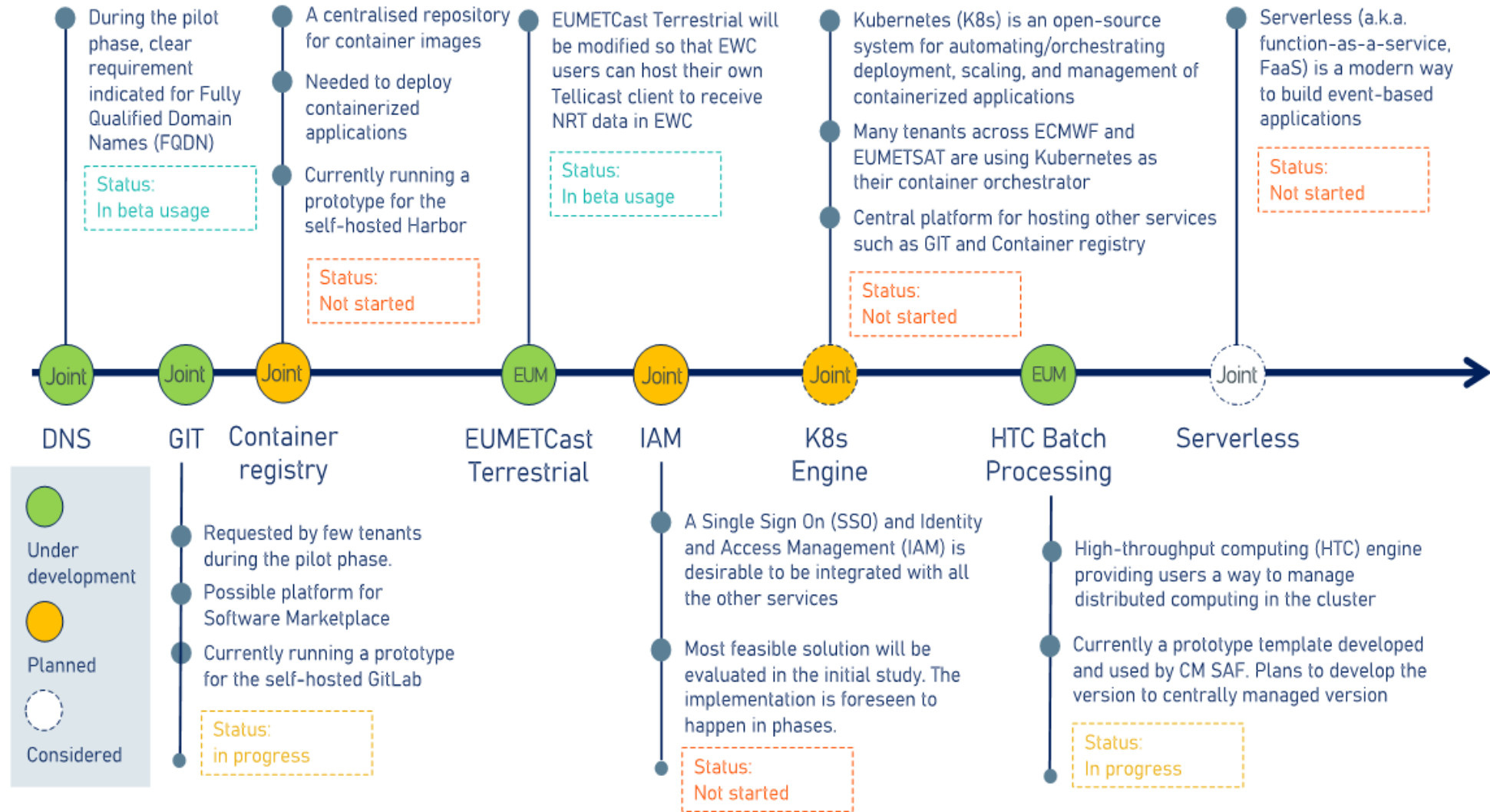
... via **Discussion Platform**
(<https://chat.europeanweather.cloud>)

or



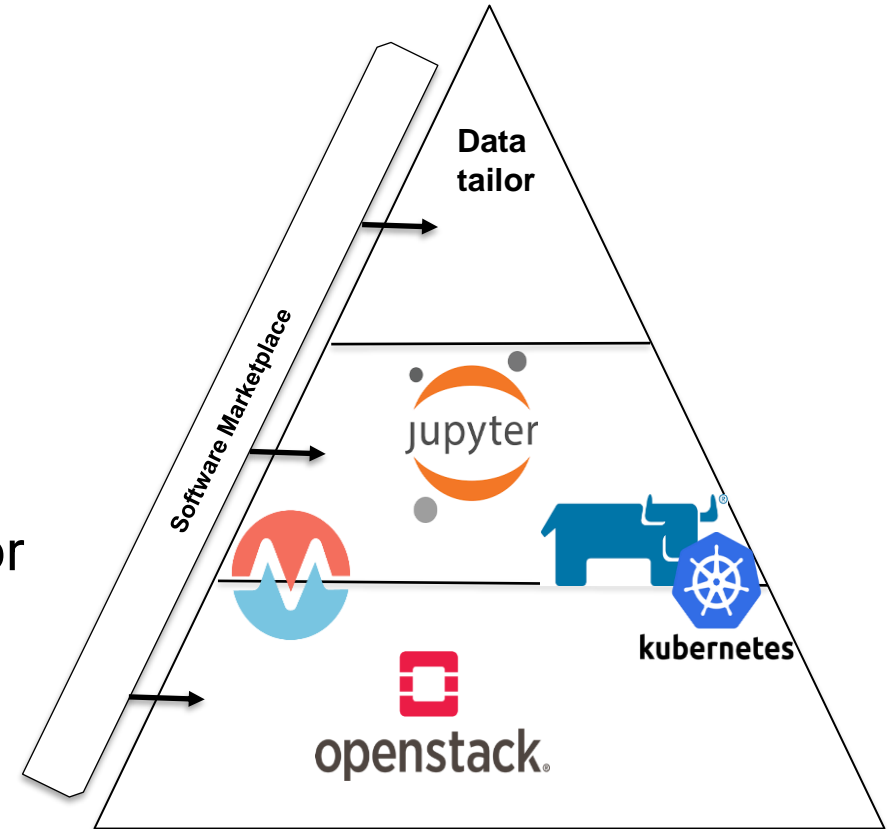
... via **Knowledge Base itself**
(<https://confluence.ecmwf.int/x/6J83Cg>)

EWC Features roadmap and software marketplace



Software Marketplace

- Place to share and collaborate
 - Domain-specific applications blueprints, templates, algorithms, documentation, etc.
 - Infrastructure-as-a-code assets
 - To be realised in one primary GIT repository with auxiliary channels
- Contributions, maintenance and application support based mainly on the community contributions → E&E support for onboarding users and maintaining assets
- Examples of possible marketplace offering:
 - Web Map Service (WMS) on ECMWF forecast data
 - Backend services for forecaster workstation/web services (e.g GeoWeb)
 - Notebook environment on ML data analytics on archive or forecast data



Thank you for your attention!