EPAM Cloud Infrastructure Orchestrator ver.2.5.172

What's New

April 2020

CI2WN-S169-172

Version 1.0

CONTENT

1 OVERVIEW

EPAM Cloud Orchestration v.2.5.172 was released on April 18, 2020.

The focus of the release is security updates, once infrastructure and platform services also faced important changes.

The **security updates** include the assignment of the LIMITED security group to all the projects, integration with HashCorp Vault, and upcoming integration with Luminate and Qualys.

At **infrastructure level**, we are glad to announce changes in machine image library, personal project's geography extension and EPAM-MAC region updates.

Majority of **platform services** face updates because of migration to the new Chef v.13 server and Chef Client v.15.4.

In the area of **costs and billing**, this release introduces price reduction for MEDIUM shapes in OpenStack regions and billing with tags for Azure tenants.

April 2020 has seen all-EPAM activities intended for the **Cloud community growth and development** including the AWS Hackathon and AWS training and certification webinar.

EPAM Cloud Knowledge Base faced major restructuring and optimization.

The functionality changes, of course, are reflected in Maestro CLI, where necessary, and in EPAM Cloud documentation. Refer to the EPAM Cloud website for detailed information on the improvements and features introduced in Orchestrator version 2.5.172.

2 INFRASTRUCTURE UPDATES

With the current release, EPAM Orchestrator faces a set of important infrastructure changes:

- personal projects' geography was extended to EPAM-US2 region
- machine image library was updated
- new MacOS Catalina 10.15.3 is available in EPAM Cloud.

2.1 PERSONAL PROJECTS UPDATES

Convenience of personal projects is the main reason they are widely used by EPAMers for their training, educational, and creative purposes.

Starting from this release, personal projects are available in three virtualization regions:

- **[NEW] EPAM-US2 (Edison, NY, USA)**
- EPAM-BY2 (Minsk)
- EPAM-IN1 (Hyderabad)

Due to this expanse, EPAMers from America will feel that the latency of their networks will decrease significantly as their personal resources will be hosted on the same continent.

We are glad to announce that for **April 2020, the price for resources in the EPAM-US2 region was reduced to the half of its original price**. With this release **the discount was prolonged till the end of May**. So, you can get more virtual capacities for their personal needs and creative activities in this region.

In order to ensure high productivity in the **EPAM-US2** region, in addition to the discount, you are given the possibility to **obtain LARGE shapes for all new personal projects** (especially applies to Windows-based VMs). For existing personal projects, LARGE shapes can be activated via a support request.

Terms and conditions of personal project usage in EPAM-US2 region are the same as in EPAM-BY2 and EPAM-IN1 regions.

Personal projects activated in the EPAM-US2 region have the same specifics as other personal projects, the basic ones are:

- EPAM-US2 personal resources cannot be used within standard project infrastructure because they are provided for personal usage only.
- EPAM-US2 personal projects are subject to the same quoting rules as personal projects activated in other regions. Personal quotas depend on the job function and level; are applied to all virtualization regions where the personal project is activated and are distributed between them.
- EPAM-US2 personal are put to a separate VLAN and do not have access to standard projects.

The resource creation limitations are summed up in this table:

Item	Description	Limit
Attached volumes	Number of storage volumes created	5 (Monthly)
Attached volume size	Size of each storage volume	10 GB
Total volume size	Total size of volume	50 GB (Monthly)
Instances	Number of instances created	2 (Daily)
Instances	**Number of existing instances**	**3 (Total existing)**

To activate a personal project in EPAM-US2 region, the user must follow these steps:

1. Click the **Activate Project** button on the Dashboard to launch the activation wizard.
2. Select **Personal** from the drop-down list of available projects and the **Private** region type.
3. Click **Add new row** and choose **EPAM-US2** from the drop-down menu.
4. Review the project and quota details and click the **Activate** button.

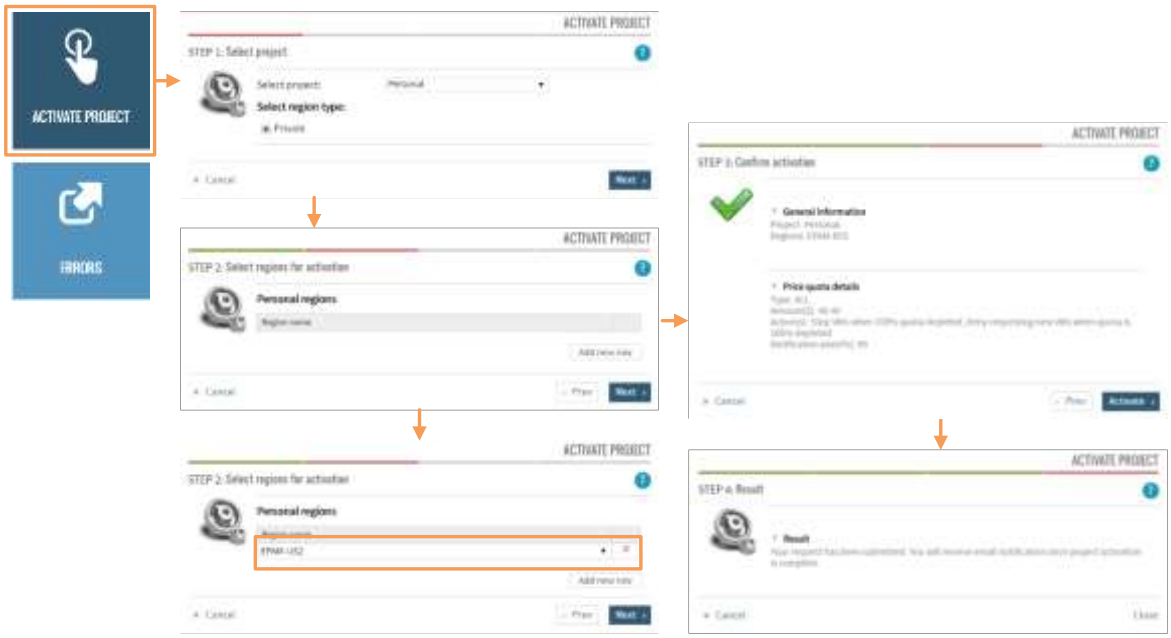

Figure 1 – Personal project activation

You can get more information about personal projects usage and limitations in the **Personal Quotas and Projects** section of the Quick Start Guide.

2.2 MACHINE IMAGE LIBRARY UPDATES

With this release we are glad to announce that machine image library was updated. Implemented changes were prompted by the fact that as RHEL 6 based distributives (CentOS 6, Oracle Linux 6) and Debian 8 are reaching their end of life in late 2020.

Since April 18, 2020, **Debian 8, CentOS 6 and Oracle Linux 6** will not be available in EPAM Cloud**.**

Start of the new VM with these types of images will not be possible as these images will be removed.

A project can request import of one of these images in exceptional cases. However, based on compliance and security recommendations, using out-of-date software for new infrastructure is not recommended, as it can cause security issues and performance degradation.

Moreover**, CoreOS Container Linux** will reach its End of Life in May 2020 and will not receive updates. In EPAM Cloud it will be substituted with **Fedora CoreOS** after testing. You can find more details by the link.

As well, we are glad to announce that **since April 23 Ubuntu 20.04 will be available** in EPAM Cloud image library after testing. Please find more details here.

2.3 EPAM-MAC REGION UPDATES

We are happy to inform you that now hardware Macmini servers with new **MacOS Catalina 10.15.3** are available in dedicated EPAM-MAC region (Minsk datacenter).

Please note that instruction on how to access new hardware MacOS instances has changed. To access Macmini with MacOS Catalina10.15.3 created in Minsk, please perform additional steps:

1. Once an instance is deployed, authorize over SSH client using the default credentials:
   - **login** - user
   - **password -** <PROJECT-ID>
2. Change the default password
3. Initiate VNC connection according to the standard instruction via VNC client and newly created password for authentication.

Figure 2 – MacOS Catalina 10.15.3

For hardware resources located in Saint Petersburg the main steps to get access to hardware MacOS instances remained unchanged.

Updated instructions describing basic steps to access your hardware MacOS instance in Minsk and Saint Petersburg locations you can find in the Quick Start Guide.

3 AUTOCONFIGURATION AND SERVICES UPDATES

We traditionally keep on improving autoconfiguration and updating platform services. This release is focused on the following improvements:

- migration to new Chef Infra Server v.13 in all EPAM Private regions
- updated the way custom scripts are run during the instance setup
- decommission of Magento Service.

3.1 AUTO CONFIGURATION MIGRATES TO CHEF INFRA SERVERS V.13

We are glad to announce that we have finished migration to the new Chef Infra v.13 server and Chef Infra Client v.15.4. In all private region locations, the new Chef Infra Servers v.13 have been deployed.

This improvement will allow us to update our code base responsible for autoconfiguration and remove or redesign some outdated solutions or services. After this release all new instances will be launched using Chef Infra Client v.15 by default.

The list of services provided by EPAM Cloud using **Chef Infra-based autoconfiguration** is given in the table below:

Service	Description
CI/CD Tools	
Artifactory as a Service (AFS)	JFrog Artifactory is a binary repository manager software designed to store the binary output of the build process for use in distribution and deployment.
Gerrit as a Service (GAS)	Gerrit is a free, web-based team code collaboration tool. It allows software developers in a team to review each other's modifications on their source code using a Web browser and approve or reject those changes. It can be closely integrated with Git. GAS is available only in the OpenStack regions.
Jenkins as a Service	Jenkins is a free and open source automation server that allows to automate the parts of software development related to building, testing, and deploying, facilitating continuous integration and continuous delivery. Jenkins slaves can be easily run using Jenkins as a Service (JaS).
SonarQube as a Service (SQS)	SonarQube (formerly Sonar) is an open-source platform developed by SonarSource for continuous inspection of code quality to perform automatic reviews with static analysis of code to detect bugs, code smells, and security vulnerabilities on 20+ programming languages. SonarQube offers reports on duplicated code, coding standards, unit tests, code coverage, code complexity, comments, bugs, and security vulnerabilities.

Service	Description
Monitoring tools	
Zabbix Server & Zabbix agent	Zabbix is an open-source monitoring software tool for diverse IT components, including networks, servers, virtual machines and cloud services. Zabbix agent can be installed on the instances in EPAM Cloud using the respective command in Maestro CLI.
Telemetry as a Service (TMS)	Telemetry as a Service (TMS) allows collecting and storing infrastructure metrics – CPU utilization, disk Read/Write operations and network traffic. The service is based on Gnocchi, a metrics database platform, and collected – a service collecting the instance metrics and sending them to Gnocchi.
Log Aggregation Service (LAS)	Graylog is a log management tool that centrally captures, stores, and enables real-time search and log analysis data from any component in the IT infrastructure and applications. The software uses three-tier architecture and scalable storage based on Elasticsearch. EPAM Cloud offers this service for centralized collection and storage of logs from instances. Syslog/Evtsys agent can be installed on the instances in EPAM Cloud with respective command in Maestro CLI.
Other Services	
Load Balancer Service (LBS)	This service is configurable with Maestro CLI Nginx that provides load balancing between the applications.
Messaging Service (MES)	Messaging Service allows to set up a RabbitMQ server for message exchange. The service is similar to Amazon SQS and is available in EPAM regions only. EPAM Private Cloud provides a special entry point in the Messaging service that may be used for communication between AWS SDK and the service.
Docker Swarm & Docker Registry	Docker Swarm provides native clustering functionality for Docker containers, which turns a group of Docker engines into a single virtual Docker engine. With the help of this service you can easily bring up a cluster of Docker master and workers. To make this service easy in use, we have pre-installed Swarmpit – user-friendly interface for Docker Swarm cluster.
Relational Database Service (RDB)	RDB service supports MariaDB, MySQL, PostgreSQL, OracleDB and MsSQL databases. For details of its operation, please refer to the documentation.
Maestro CLI	Maestro CLI is not a service, but a role that deserves special attention. It allows to easily install the Maestro CLI on your instance.

3.2 RUNNING INSTANCE WITH CUSTOM SCRIPTS

We are glad to inform that we have unified the implementation of virtual machines initialization for all cloud providers. This feature will allow to avoid native cloud restrictions.

EPAM Cloud users always have had an opportunity to use their custom scripts while running an instance. But each cloud provider, both private and public, has its specific limitations regarding this feature. For example, Amazon replaces Cloud Init approach with their own solution and has certain restrictions for the file sizes and required script compression. To provision VMs in any cloud provider EPAM Orchestrator compile single script from the initialization script, which checked configuration, sent notifications and performed basic maintenance and user script was added at the end. These two operations were performed simultaneously. Typically, users didn't know the size of the script which was recommended and thus, if a user specified over-sized script, both initial and user scripts were not executed. As a result, users refused to utilize this feature and run VM without custom scripts or used native consoles.

We have taken into consideration all these concerns and offered a solution that was implemented in this release. Now for all cloud providers one single EPAM related script is used. It performs all required functions and initiates downloading of custom scripts from EPAM Orchestrator. This approach allowed to avoid all limitations and now users can specify any number of supported scripts. If any of custom script has an error, it won't influence the whole VM configuration.

With this release users can specify their custom parameterized scripts during virtual machine initialization using **or2-run-instance(or2run)** Maestro CLI command.

Specifics of the current implementation:

- For **Linux-based systems** – running Shell scripts will be executed at a Bash interpreter,
- For **Windows-based systems** – PowerShell scripts (with .ps1 extension) will be launched via PowerShell interpreter and Batch scripts (with .cmd extension) will be executed via cmd. Both of them will be launched with the highest privileges.

All scripts support passing the parameters, the values of which can be set during the instance start.

To run an instance with the custom script, invoke **or2run** (**or2-run-instance**) command and specify

-i (image), **-p** (project), **-r** (region), **-s** (shape) and **-t** (script name).

```
or2run -i image -p project -r region -s shape -t script-name
```

Response example:

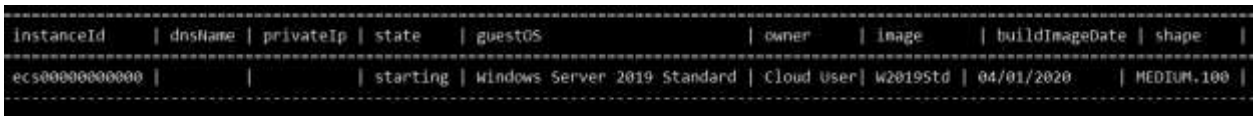

Figure 3 – Applying script on run instance

3.3 MAGENTO SERVICE DECOMMISSION

With this release we want to inform you that Magento Service will not be available in EPAM Cloud after April 18, 2020.

4 SECURITY UPDATES

Security is the question of the greatest concern for all data owners. Current release includes the latest security updates in two principal directions:

- New security policy limiting the project's traffic.
- Future integration with HashiCorp Vault, Luminate, and Qualys.

4.1 PROJECT SECURITY UPDATE IN EPAM CLOUD

In April, the new security policy limiting the project's traffic was applied to the projects activated in EPAM Cloud.

The new security policy is based on the requirements which were advanced by the EPAM security team in order to enhance the security of the projects. These requirements are:

1. Outbound connections from your virtual servers in EPAM Private Cloud to virtual servers of other projects in EPAM Private Cloud are not allowed by default. This is the main change in network operation that EPAM Cloud users will face.
2. Inbound connections from EPAM Internal network (corporate workstations and servers in offices or connected via VPN) to your virtual servers in EPAM Private Cloud are allowed as usual (no changes here).
3. Outbound connections from your virtual server in EPAM Private Cloud to Internet are allowed as usual (no changes here).
4. Outbound connections from your virtual server in EPAM Cloud to essential services in EPAM are allowed, according to the pre-defined rules list.
5. Outbound connections from your virtual servers in EPAM Private Cloud to other servers in EPAM Private Cloud within the same project are allowed as usual (no changes here).
6. Virtual servers in EPAM Private Cloud cannot initiate connection to workstations, however, they can reply to any request according to the paragraph #2.

In order to provide smooth and seamless transition to this new security policy, EPAM Cloud team has performed these important actions:

- New apparatus was developed that allowed fulfilling all the security requirements.
- Concept of security groups and modes was reworked and improved.
- Mechanism of reviewing and modifying the project's inbound and outbound traffic according to the new security requirements was developed and introduced into action.

This mechanism infers that in order to minimize unfavorable effects from the assignment of the new security policy, a project manager or another responsible person must prepare the complete list of EPAM internal services to which their project connects and submit it by the corresponding support request. The services listed in the support request will be added to the default security mode, and their traffic will be fully preserved.

4.1.1 Security Groups and Modes in Private Regions in EPAM Cloud

Currently, EPAM Cloud supports two types of networks:

- **External** is managed by the EPAM Network team. Is activated/deactivated by the corresponding support requests.
- **Internal** is a project-related SDN. Details about the SDN usage can be found here.

Every project can belong to one of two security groups:

- **Default** is applied by changing the security mode.
- **Custom** is a project-related exception that is specifically defined according to the project requirements. Custom security group is independent of the security mode and doesn't change when the security mode is changed.

This diagram illustrates the concept of networks, security groups and modes in EPAM Cloud:

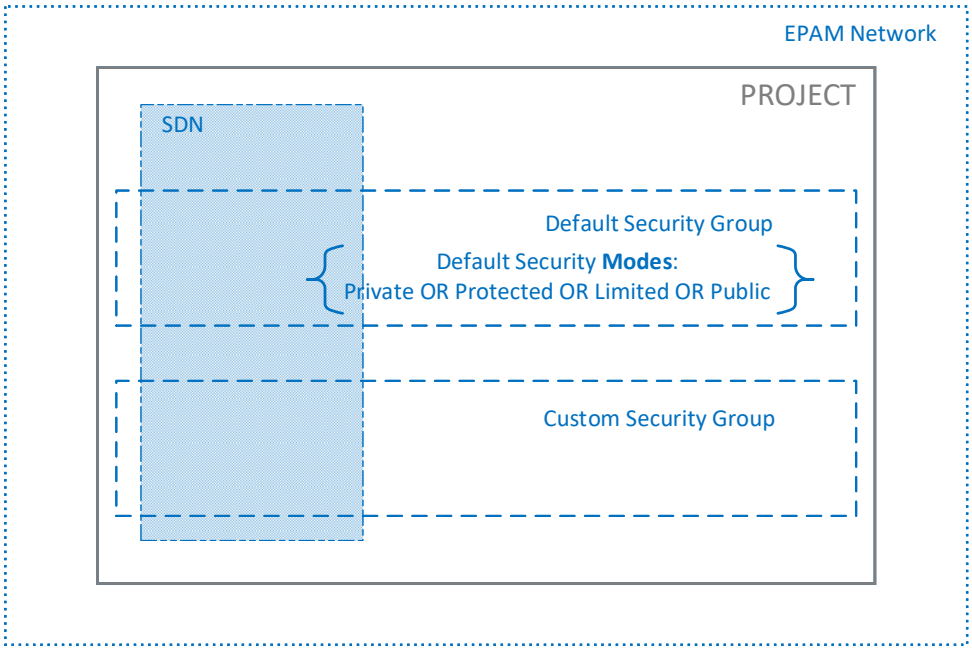

Figure 4 – Networks, Security Groups and Modes

Currently, we have four security modes that can be applied to a project:

PUBLIC: Project's VMs are publicly available; any inbound or outbound traffic is allowed.

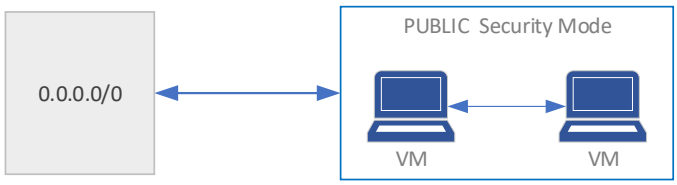

Figure 5 – Public Security Mode

LIMITED: inbound connections from EPAM internal network (corporate workstations in offices and connected via VPN) are not restricted; still, outbound connections from VMs in EPAM Private Cloud to VMs in other projects are restricted by default. VMs within the same project can communicate with each others without restrictions.

This security mode is recommended for newly activated projects without defined security requirements.

PROTECTED: The project is isolated from the external traffic but its VMs have full access to internal EPAM services like mail, AD, Jira, Git, etc.

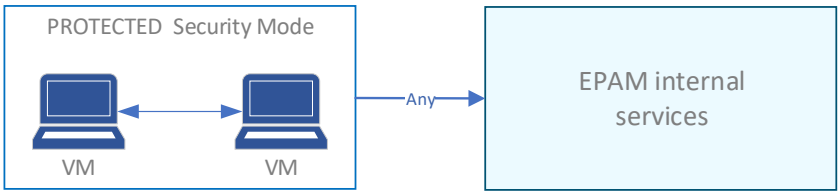

Figure 6 – Protected Security Mode

LIMITED and PROTECTED security modes allow the inbound traffic from Orchestrator, Luminate, Qualys, and other EPAM security services.

PRIVATE: The project is completely isolated; only inner traffic between the project's VMs is allowed; any inbound or outbound traffic is prohibited.

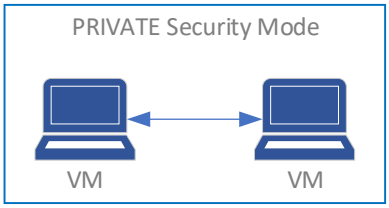

Figure 7 – Private Security Mode

4.1.2 Changing the Project's Security Settings

Security settings of the project can be changed only by corresponding support requests:

1. Modifying Project Security Group in OpenStack support request is submitted to update security group settings for your project in OpenStack regions. Specify the project and the new setting for security groups.
   The request needs approval from Project Manager or Project Coordinator.

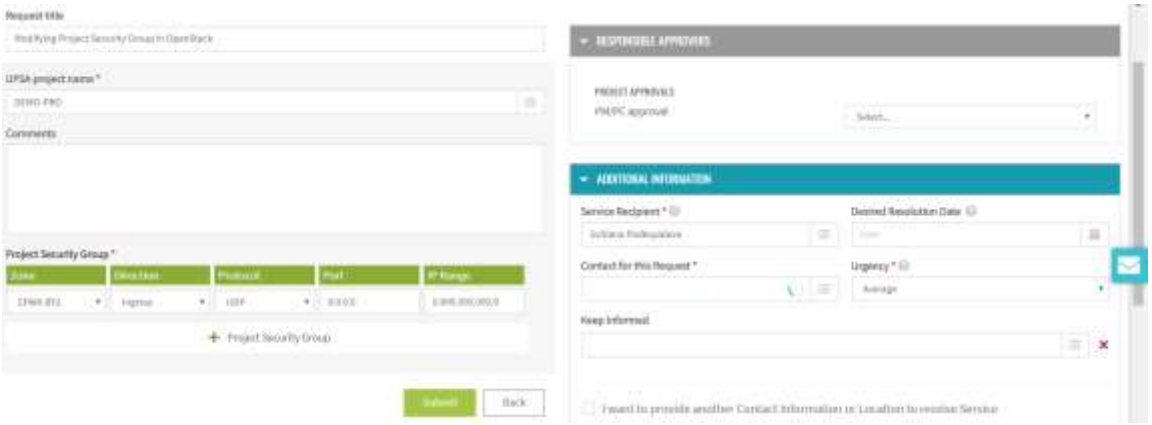

Figure 8 – Update Security Groups Settings Request

2. Modifying Project Security Mode in OpenStack support request is submitted for changing the security mode for the project. Specify the project name and the new security mode.
   The request needs the approval from a Project Manager or Project Coordinator:

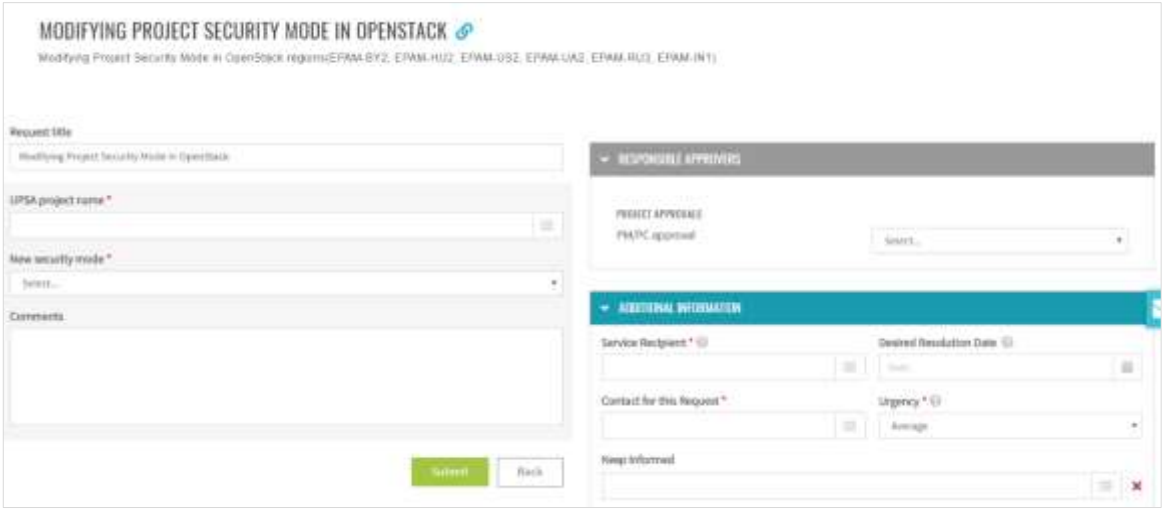

Figure 9 – Modifying Project Security Mode in OpenStack support request

4.2 ENTERPRISE SECURITY INTEGRATION

We are glad to announce that EPAM Cloud is working on the integration with HashyCorp Vault, Luminate, and Qualys to enable deeper enterprise-level security management and checks on project level.

4.2.1 Initial Integration with HashiCorp Vault

HashiCorp **Vault** is a secure secret storage system intended for storing your passwords, keys, tokens, access codes, etc., at the highest possible security level.

Starting from this release, all credentials for Azure and AWS tenants are safely stored in Vault and are securely used by Orchestrator for managing project resources

4.2.2 Upcoming Integration with Luminate

EPAM has already been using Luminate for its BSS services like Jira, Time, KB, etc. Now we are starting to integrate Luminate with EPAM Cloud in order to enhance security and protection of cloud projects.

Upcoming integration with **Luminate** will comprise two stages – integration with the resources in **private regions** and integration with the resources in **public clouds** (AWS, Azure, Google) – and will include:

- adding a parameter to the **or2run (or2-run-instances)** command (Maestro CLI) for registering a VM at Luminate after deployment,
- adding an option to the **Run** wizard (Cloud UI) for registering a VM at Luminate after deployment,
- implementing the functionality allowing to register requested instances on Luminate by Luminate API and removing the registered Luminate scanners after the instance termination,
- adding IPs of the public Luminate scanner to the list of allowed services for the default security groups in the OpenStack regions (Limited and Protected),
- adding IPs of the public Luminate scanner to the list of allowed services for the default security groups in AWS.

4.2.3 Upcoming Integration with Qualys

Qualys is already used by EPAM Cloud for security checks and scanning (for example, in monthly Qualys Cloud View Report describing the vulnerabilities detected on the account level in public clouds).

Now we are proud to introduce that deeper integration with Qualys is upcoming.

Upcoming integration with **Qualys** will comprise three stages:

Option Description	Supported Clouds
Automated mechanism for **setting up the Qualys connector during the project activation** and terminating it after the project's termination.	AWS, Azure, Google
Automated procedure for deploying the **Qualys scanner to a dedicated instance within a project**.	AWS, Azure, Google
Including **Qualys agent as a standard software** for Enterprise/Public VMs.	EPAM Private Cloud

Further integration with Vault, Luminate, and Qualis will be announced and described in future releases.

5 BILLING AND REPORTING UPDATES

Costs and billing is the among most sensitive aspects in the utilization of any resources. EPAM Cloud team constantly looks for new ways how to make billing more affordable and manageable for Cloud users.

Current release introduces two important changes in the billing area:

- billing updates for OpenStack regions,
- introduction of billing with tags for Azure tenants.

5.1 BILLING UPDATES IN PRIVATE REGIONS

We are glad to announce that prices for shapes in all private regions were reviewed and reduced.

Starting from April 18, **MEDIUM shapes in CSA and OpenStack regions will come for reduced prices** both for Windows and Linux.

Now, the estimated monthly price for the most used VM types active 24/7 in private region is as follows:

Image Type	Shape	Before	Now
Windows	**MEDIUM**	**$51.28**	**$40.39**
	LARGE	$74.78	$74.78
Linux	SMALL	$13.88	$13.88
	MEDIUM	**$41.53**	**$30.64**
	LARGE	$61.28	$61.28

As you know, billing in private clouds is based on the pay-as-you-go principle. This diagram describes the elements that comprise the cost of running and stopped VMs:

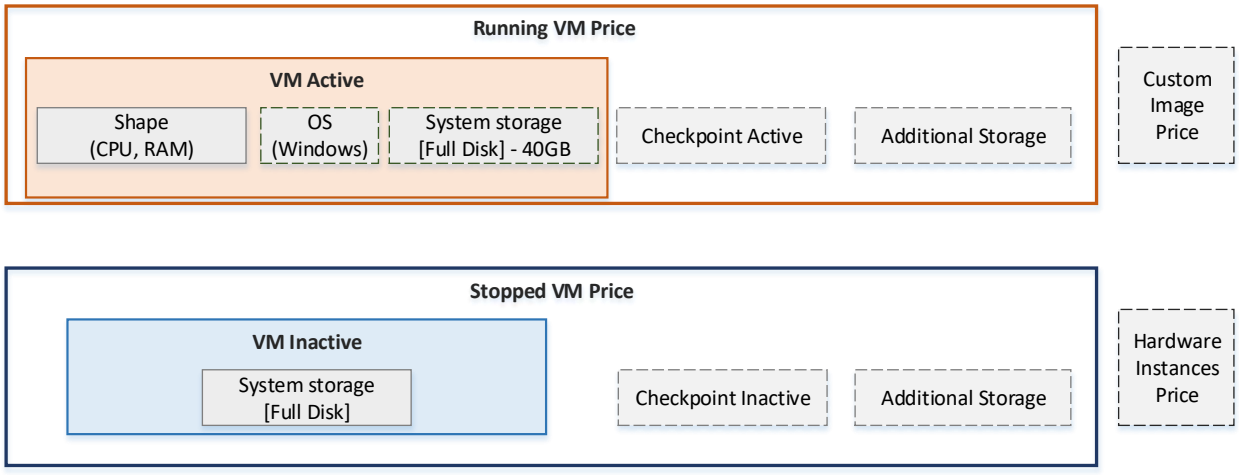

Figure 10 – Prices Breakdown

Please, note that in OpenStack regions, the storage is billed for provided amount, irrespective of the actual usage.

5.2 REPORTING BY TAGS FOR AZURE REGIONS

Tags is an effective tool for identifying Cloud resources (such as instances, checkpoints, and volumes) for their reference and manipulation. Tags are also used for creating billing reports focused on specific groups of resources.

We are glad to announce that with this release, billing reports by tags is also available for Azure tenants.

Reporting by tags can be requested via both Cloud UI and Maestro CLI.

To get a report via UI, do the following:

1. Go to the Reporting page.
2. Select the necessary project.
3. Enter the tag to the **Tag** filter and press **Show**.

Figure 11 – Billing with tags for Azure in Cloud UI

Please note that these words are reserved by Azure and cannot be used as a tag prefix or a tag key – **microsoft**, **azure**, **windows**:

Figure 12 – Setting a reserved word as a tag key

To filter reports for Azure tenants by a specific tag in Maestro CLI, use **or2report** command with the following parameters:

```
or2report -p project -r region –m month -y year -g tag
```

For example,

Figure 13 – Report by tags for Azure in Maestro CLI

6 CLOUD COMMUNITY GROWTH AND DEVELOPMENT

Expertise growth has always been one of our priorities and we are paying much attention to these activities. This April Cloud Consulting team was involved in organization of three educational events:

- AWS Security Challenge Hackathon
- AWS training and certification webinar

Moreover, the number of EPAMers who passed AWS, Google Cloud of Azure certifications has significantly grown.

6.1 AWS SECURITY CHALLENGE HACKATHON

On April 11, we have conducted **AWS Security Challenge hackathon**. It is a one-of-a-kind event that combined features of a hackathon and an individual tournament — an 'individual hackathon' in online mode. The event was held on a specially designed platform in the AWS environment.

The **aim** of the event was to increase awareness and check participants' skills and knowledge in AWS security risks. After performing the tasks, members of the event were able to improve their skills in:

- Various AWS services and their capabilities
- Using AWS CLI
- Setting correct access to AWS resources
- Planning database
- Avoiding the most widespread mistakes in setting webservers

100 participants decided to cope with the challenge. The organizers wanted the hackathon to be fair as all participants were performing the same tasks, so event members were divided into two groups depending on the AWS experience:

- Production (participants with production experience in AWS)
- Educational, students (beginners, who are just interested in AWS technology and don't have enough experience)

The event was held in a '**capture the flag'** format.

Each participant received access to the **AWS SECURITY CHALLENGE platform** infrastructure and had to perform tasks in six modules. Each module was focused on a certain vulnerability. Participants had to detect it and perform related tasks. The scenarios covered the following vulnerabilities:

- IAM policies misconfiguration
- Credentials open storage
- SSRF attacks
- Searching for exploit for reverse-proxy
- RCE exploit
- Error in database configuration

The criteria of judgement were the amount of passed modules and total time spent. **Best 5 participants** in each category received **1-month trial for AWS WorkSpaces**.

There were two communication channels: emailing and Teams group, where all participants were able to ask question and receive answers from the support team.

Details about AWS Security Challenge hackathon procedure you can find by this link.

In the nearest possible time, we are planning to publish an article with the winners' names and details about the hackathon on the Info Portal.

6.2 AWS TRAINING AND CERTIFICATION WEBINAR

On April 22, Cloud Consulting team in cooperation with AWS team is conducting **AWS training and certification webinar.**

This event is organized for our colleagues from all EPAM offices who are interested in AWS trainings and certifications and planning to take them in 2020.

Speakers will deliver detailed information about:

- **AWS Learning Paths overview (AWS team)**

  This section will provide the details about AWS learning paths that are grouped by role, solutions area, or by AWS Partner Network (APN) partner needs. They provide a recommended progression of courses and exams to help advance your skills or prepare to use the AWS Cloud.

- **Certification (AWS team)**

  In this section participants will be given the details about procedure of getting AWS Certified in 2020 and why exam preparation is more complete and easier to access.

- **Digital learning (AWS team)**

  There are specific tracks by role, and technical topics by specialty, that allow to focus the efforts on what matters most to the career growth.

- **Exam readiness tips and tricks (AWS team)**

  This webinar section will be focused on AWS specifics, exam format, useful tactics and best practices that should be taken into account while you are going through the exam questions.

- **AWS Education in EPAM (EPAM team)**

  Details about specifics of AWS education and certification processes in EPAM will be discussed here.

Video recording of the webinar will be available on the Video Portal.

6.3 CERTIFICATION RATES GROWTH

Since the beginning of 2020 we noticed that number of our colleagues who decided to improve their knowledge and skills has grown comparing with previous years.

In winter we brought up to date the collection of badges for Azure exams and certifications, so now Azure badges include Microsoft Azure Certified Exam badge, Microsoft Azure Certified Fundamentals badge, Microsoft Azure Certified Associate badge and Microsoft Azure Certified Expert badge.

We have analyzed the latest statistics about certifications passed by EPAMers and badges grated only during the first three months of 2020. Here we are glad to share the results with you:

Badge	Description	Total granted	Granted in 2020
AWS Badges		**1527**	**107**
	Granted for passing the AWS Certification and achieving the Specialty level.	23	4
	Granted for passing the AWS Certification and achieving the Professional level.	39	5
	Granted for passing the AWS Certification and achieving the Associate level.	242	58
	Granted for completing any of the free courses provided within Amazon Partner Network program (a single training taking 6 hours or more or set of shorter trainings with at least 8 hours in total).	1223	40
Google Cloud Badges		**3260**	**382**
	Granted to those, who successfully completed all requirements to be recognized as Google Cloud Certified Professional.	920	80
	Granted to those, who successfully completed all requirements to be recognized as Google Cloud Certified Associate.	158	61
	Granted for completing a full Google Cloud Platform Specialization on Coursera or other similar training classes for the designated track	1428	25
	Granted for those who passed basic courses on the free platforms (for example Coursera).	754	216

Badge	Description	Total granted	Granted in 2020
Azure Badges		**667**	**573**
	Passing Microsoft Azure Expert certification	30	22
	Passing Microsoft Azure Associate certification	108	88
	Passing Microsoft Azure Fundamentals certification	185	160
	Passing Microsoft Azure exam	344	303

We highly appreciate this input to improving the expertise level. EPAM's professional excellence got a great boost and keep on growing significantly this year, which opens new opportunities for both EPAM and our customers.

And of course, if you have a certificate which is not marked yet as an EPAM Hero, please submit a request with details of your certification using the link, and get a respective Cloud badge.

7 MAESTRO CLI CHANGES

The changes in EPAM Cloud functionality are traditionally reflected in updates in Maestro CLI.

These commands were updated in the new release:

- **or2-describe-files (or2df):** help output was updated
- **or2-get-access (or2access):** help output was updated
- **or2-delete-maestro-stack (or2delmstack):** help output was updated
- **or2-audit (or2audit):** help output was updated
- **or2-move-instance-to-vlan (or2mivlan):** help output was added
- **or2-describe-eo-account (or2dacc):** help output was added
- **or2-unregister-hardware-server (or2unreghs):** help output was added
- **or2-aws-management-console (or2awsmc):** help output was added
- **or2-disassociate-static-ip (or2dissip):** help output was updated
- **or2-start-telemetry (or2starttel):** help output was added
- **or2-describe-projects (or2dpro):** help output was updated
- **or2-describe-shapes (or2dshape):** help output was added

You can find the detailed information on Maestro CLI usage and commands references in Maestro CLI User Guide.

8 DOCUMENTATION AND KNOWLEDGE BASE UPDATES

All changes and updates to the EPAM Orchestrator functionality were reflected in the documentation and in the EPAM Cloud knowledge base.

With the release of EPAM Orchestrator 2.5.172, the following documentation updates were made:

- Maestro CLI User Guide was updated with reviewed information on Hardware MacOS, instance termination and working with volumes
- Quick Start Guide was updated with the reviewed information on personal projects and Hardware MacOS
- Hybrid Cloud Guide was updated with reviewed information about machine image library and instance termination
- Services Guide updates include Magento service removing.

We are glad to introduce the refined and optimized EPAM Cloud Knowledge Base.

EPAM Cloud Consulting team has analyzed the most popular KB requests concerning and developed a new structure that is better aligned with the ever-changing needs of the EPAM Cloud users.

1. Existing pages were regrouped and relocated based on the traffic ranking and attendance record.
2. Rarer visited pages were removed from the top-level menu and deposited to the Archive folder. Such an organization will bring the focus to the in-demand KB sections but keep the data available for the users who need it.
3. Most popular pages were reviewed and updated with the latest information:
    - Quick Start. The page introduces the supported regions and clouds; explains how the projects are activated; gives a short overview of the available capacities; informs the reader about the accessibility of native management tools, etc.
    - Personal Projects and Free Tiers. The page describes the cloud resources which can be used by EPAMers for their educational and training purposes - personal projects in private regions and free tiers in public clouds (AWS, Azure, Google).
    - Cloud Permissions. The page clarifies the concept of cloud permissions; explains how they are assigned and managed; illustrates their differences and similarities with the default access roles. The main focus of the page lies on answering the most popular user questions. Answers are grouped by the cloud provider and can be approached both from the main page and its sub-pages.
    - Billing and Quotas. The page introduces the billing model of the EPAM Cloud; explains how costs are estimated for private regions, AWS, Azure, and Google; gives an insight to the reporting facilities of the EPAM Cloud Orchestrator (including the month-end reports); and describes the specifics of the project quoting in EPAM Cloud.
    - Contacts and Support. The page shows three ways of how to make a support request and explains how they are processed and resolved.

All the pages include useful links leading to the available user guides and documentation.

EPAM Cloud Knowledge Base can also be useful for experienced cloud users when they need a quick reference.

TABLE OF FIGURES

VERSION HISTORY

Version	Date	Summary
1.0	April 18, 2020	First published