



mClouds - Cloud based workspaces
10th -11th December 2018:

Martin Klosek, eWorks GmbH

Topics

- Share computing resources between the partners in Europe: A distributed cloud
 - Share educational workspaces
- MECA global template repository (MGTR)
- MECA region dashboard
- MECA region instance scheduler



Share computing resources

- Between the partners in Europe participating
 - Share educational workspaces
 - Common use of best practice installations in classroom sessions
- We decided for the Apache CloudStack (ASC) private cloud management software and Linux KVM as hypervisor
 - Base software is open source
 - Uses non-expensive hardware
 - Workspaces with Linux and Windows (licenses must be provided by partners)



MECA

MicroElectronics Cloud Alliance

www.meca-project.eu/



Partners with hardware and software resources in the mClouds system – across Europe



MECA

MicroElectronics Cloud Alliance
www.meca-project.eu/



Partners with hardware and software resources in the mClouds system

apachecloudstack

0 Notifications | MECA Admin

Project: Default view

Home > Regions >

Viewing Regions

Name	ID	Endpoint	Quickview
MECA-PolITO	1		+
MECA-eWorks	2		+
MECA-BME	3		+
MECA-UKIM	5		+
MECA-TUS	6		+
MECA-UPB-CETTI	7		+
MECA-UNED	8		+
MECA-INSA	9		+
MECA-TUB	10		+
Region1-Local-Test	999		+



Final dissemination workshop 10th -11th December 2018:
mClouds - Cloud based workspaces

Topics

- Share computing resources between the partners in Europe
 - Share educational workspaces
- **MECA global template repository (MGTR)**
- MECA region dashboard
- MECA region instance scheduler



Tight vs loose coupling of systems

- CloudStack is focused on a private cloud setup in integrated environments
 - with tight coupling of resources in a network
- In MECA, several different authorities control networks, computing resources, software and access rights
 - So a loosely coupled approach was chosen:
A distributed cloud of independent partners

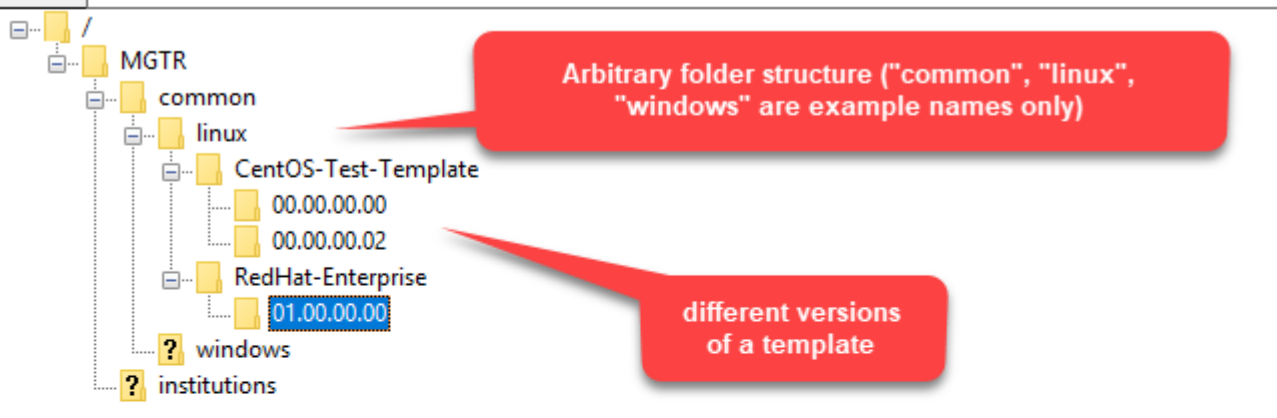


MECA global template repository (MGTR)

- CloudStack provides a region feature very similar to the commercial cloud providers Amazon Web Services (AWS) or Microsoft Azure:
 - Each partner institution stays independent
 - We decided for “1 CloudStack region” = “1 institution”
 - One or more management servers in each institution
- Drawback: Missing features for a truly distributed cloud. Had to implement additionally in MECA like:
 - Virtual machine template sharing over long distance slow networks
 - Scheduling to avoid resource conflicts of partner institutions
 - Resource consumption overview

MECA global template repository (MGTR)

Server: /MGTR/common/linux/RedHat-Enterprise/01.00.00.00



Arbitrary folder structure ("common", "linux", "windows" are example names only)

different versions of a template

Dateiname	Dateigröße	Dateityp	Zuletzt geändert	Berechtigu...	Besitzer/Gr...
..					
CentOS-6-x86_64.7z.001	52.428.800	WinRAR-A...	21.06.2017 16:4...	-rw-r--r--	u147030 u1...
CentOS-6-x86_64.7z.002	52.428.800	002-Datei	21.06.2017 16:4...	-rw-r--r--	u147030 u1...
CentOS-6-x86_64.7z.003	35.047.259	003-Datei	21.06.2017 16:4...	-rw-r--r--	u147030 u1...
config.ini	92	INI-Datei	21.06.2017 18:2...	-rw-r--r--	u147030 u1...

config file per template

chunks



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- Share computing resources between the partners in Europe
 - Share educational workspaces
- MECA global template repository (MGTR)
- [MECA region dashboard](#)
- MECA region instance scheduler



MECA region dashboard

- visual real-time overview of resources currently in use and available in all regions
- similar to CloudStack's Dashboard view but as a summarization from all regions
- updated frequently every 5 minutes
 - uses CloudStack's API (HTTPS/TLS encrypted)
 - plus single resource view of each region

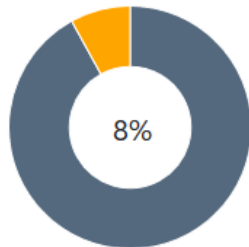
Project: Default view

[Home](#) > [MECA region dashboard](#) >

MECA region dashboard

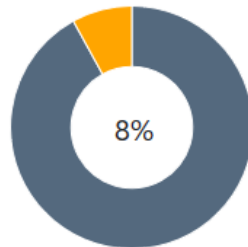
MECA cloud statistics over all regions:

Memory



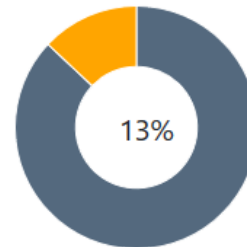
13.5 GB / 158.99 GB

CPU



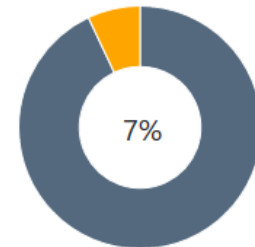
11.50 GHz / 141.45 GHz

Allocated Storage



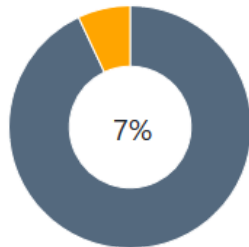
329.97 GB / 2.54 TB

Primary Storage



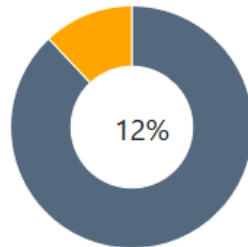
436.41 GB / 6.44 TB

Management IP Adresses



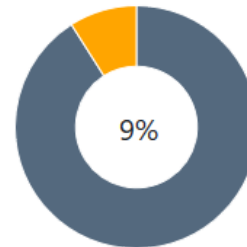
12 / 163

Secondary Storage



316.29 GB / 2.49 TB

Shared Network IPs



40 / 468

Last updated: 2018-10-06 20:30

Dashboard

Instances

Affinity Groups

Storage

Network

Templates

Events

Projects

Accounts

Domains

Regions

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Service Offerings

MECA region dashboard

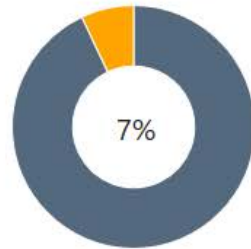
MECA instance scheduler

Project: Default view



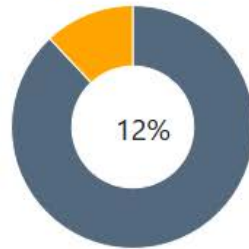
Home > MECA region dashboard >

Management IP Addresses



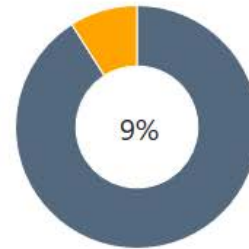
12 / 163

Secondary Storage



316.29 GB / 2.49 TB

Shared Network IPs



40 / 468

Last updated: 2018-10-06 20:30

[MECA-eWorks](#)

[MECA-TUS](#)

[MECA-UKIM/FEEIT](#)

[MECA-UNED](#)

[MECA-INSA](#)

[MECA-BME](#)

single resource view
of each region

Dashboard

Instances

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Storage

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Templates

Events

Projects

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Regions

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Global Settings

Service Offerings

MECA region dashboard

MECA instance scheduler

MECA

Project: Default view

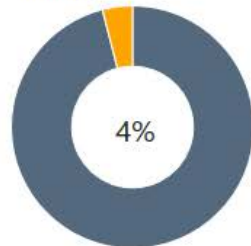


Home > MECA region dashboard >

[MECA-eWorks](#)

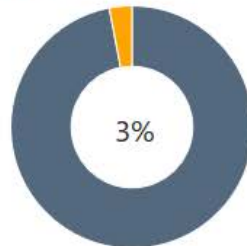
[MECA-TUS](#)

Memory



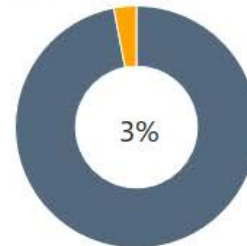
2.25 GB / 61.65 GB

CPU



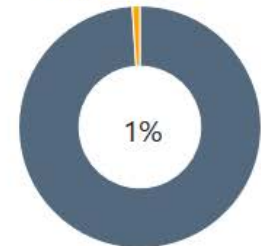
2.00 GHz / 67.01 GHz

Allocated Storage



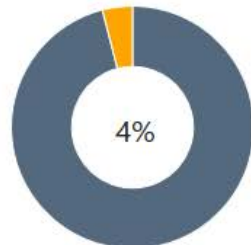
27.07 GB / 916.77 GB

Primary Storage



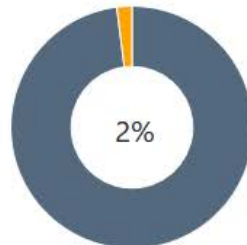
15.3 GB / 1.79 TB

Management IP Addresses



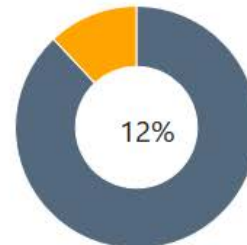
2 / 50

Secondary Storage



20.95 GB / 916.77 GB

Shared Network IPs



6 / 50

single resource view of each region

Dashboard

Instances

Affinity Groups

Storage

Network

Templates

Events

Projects

Accounts

Domains

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MECA region dashboard

MECA instance scheduler

Project: Default view

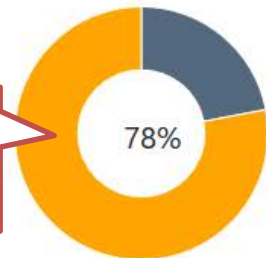
MECA-eWorks

Home > MECA region dashboard >

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- Regions
- Infrastructure
- Global Settings
- Service Offerings
- MECA region dashboard**
- MECA instance scheduler

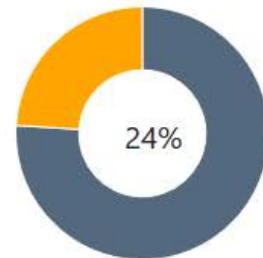
MECA-eWorks

Memory



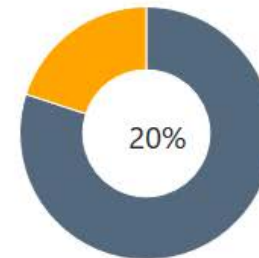
39.25 GB / 50.54 GB

CPU



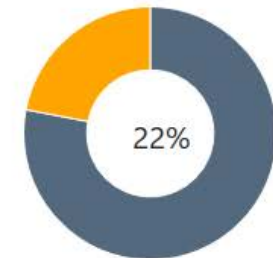
21.00 GHz / 85.92 GHz

Allocated Storage



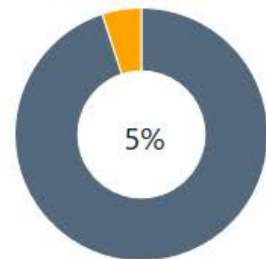
362.47 GB / 1.8 TB

Primary Storage



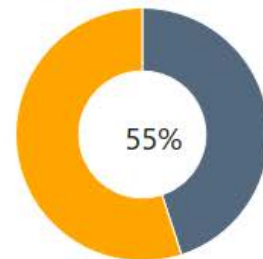
795.3 GB / 3.6 TB

Management IP Adresses



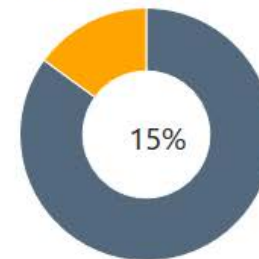
2 / 40

Secondary Storage



251.38 GB / 458.33 GB

Shared Network IPs



27 / 180

higher load when machines are running



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- MECA region instance scheduler



MECA region instance scheduler concept

- Implementation of auto-provisioning logic to scale the web eLearning environment depending on the load, especially for usage peaks and for the mobility of eLearning resources.
 - It should be able to host the virtual PCs with learning and laboratory software in any MECA CloudStack region.
 - Preferably in those regions who have the least load at the time and which are regionally closest to the region of the instructor / university.



MECA region instance scheduler concept

- One requirement discussed among the partners in the virtual meetings is the priority of using the own hardware / region.
 - This means that if a teacher in a region wants to held a planned classroom session the virtual machines should preferably be run in his own region.
 - If there are no blocked resources in other regions they can be used to share resources between the partners (what will demonstrated later).
- So we need a visual schedule where each teacher can reserve his own region (time slots)

Project: Default view



Home > MECA instance scheduler >

MECA region instance scheduler

Please see and plan your classroom sessions in the following schedule to reserve instances



today

Oct 7 – 13, 2018

month

week

day

	Sun 10/7	Mon 10/8	Tue 10/9	Wed 10/10	Thu 10/11	Fri 10/12	Sat 10/13
09:00							
10:00							
11:00					11:00 am - 12:00 pm FEFIT classroom session		
12:00		12:00 pm - 02:00 pm TUS classroom session				12:00 pm - 02:00 pm TUS classroom session	
13:00							
14:00				02:00 pm - 04:00 pm FEFIT classroom session			
15:00		03:00 pm - 05:00 pm FEFIT classroom session					
16:00							
17:00							
18:00							

legend:

- MECA TUS
- MECA UKIM/FEFIT
- MECA eWorks
- MECA UNED
- MECA INSA
- MECA BME

Dashboard

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MECA region dashboard

MECA instance scheduler

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- Regions
- Infrastructure
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- Service Offerings
- MECA region dashboard
- MECA instance scheduler**

MECA region instance scheduler

Please see and plan your classroom sessions in the following schedule to reserve instances

< > today **December 2018** month week day

Sun	Mon	Tue	Wed	Thu	Fri	Sat
25	26	27	28	29	30	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
10:00 am Windows training	01:00 pm Budapest Workspace Session	10:00 am CAD session TUS	01:30 pm Optimization lesson	09:00 am Packaging Exercise		
16	17	18	19	20	21	22
23	24	25	26	27	28	29

legend:

- MECA TUS
- MECA UKIM/FEEIT
- MECA eWorks
- MECA UNED
- MECA INSA
- MECA BME



MECA region instance scheduler

- allows planning of time-slots of online-lessons
- preferred region can be selected
- Mass start: number of instances can be selected depending on needs
- By one mouse-click: Mass start and stop of several reserved instances

Project: Default view

Home > MECA instance scheduler >

MECA region instance scheduler

Please see

schedule session

Start: 2018-10-08

10:00

End: 2018-10-08

11:30

Title:

Test session

Owner:

Martin

Region:

MECA INSA

Template:

CentOS-7-x86-64-Minimal-1708.iso

Number of Instances:

4

Comments:

reserve slot

Select institution
(= region) and number of
desired instances

Project: Default view



[Home](#) > [Instances](#)

Filter by All

[Metrics](#)

[+ Add Instance](#)

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- MECA region dashboard
- MECA instance scheduler

<input type="checkbox"/>	Name	Internal name	Display Name	IP Address	Zone Name	State	Quickview
<input type="checkbox"/>	VM-78035fce-8976-4d15...	i-4-233-VM	VM-78035fce-8976-4d15...		MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-425b9814-26ed-462...	i-4-232-VM	VM-425b9814-26ed-462...		MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-b7d6dffc-973f-40da...	i-4-231-VM	VM-b7d6dffc-973f-40da...		MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-7765d66b-4c01-43a...	i-4-230-VM	VM-7765d66b-4c01-43a...		MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	CentOS7-MECA-Dashboard	i-8-42-VM	CentOS7-MECA-Dashboard	172.16.20.54	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	UbOnHOST03	i-4-38-VM	UbOnHOST03	172.16.20.67	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	CentOS7-Minimal-Template	i-4-36-VM	CentOS7-Minimal-Template	172.16.20.109	MecaZoneEworks2	Running	+
<input type="checkbox"/>	VM-967a230f-7eff-4249...	i-4-168-VM	VM-967a230f-7eff-4249...	172.16.20.59	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-9ce4b2d0-c9fa-4ba0...	i-4-167-VM	VM-9ce4b2d0-c9fa-4ba0...	172.16.20.62	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-12934144-0fee-4eff...	i-4-166-VM	VM-12934144-0fee-4eff...	172.16.20.126	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-16bc352b-29dc-432...	i-4-165-VM	VM-16bc352b-29dc-432...	172.16.20.51	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-a401cd47-05ce-404...	i-4-164-VM	VM-a401cd47-05ce-404...	172.16.20.142	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-420f80f2-1c28-4d4f...	i-4-163-VM	VM-420f80f2-1c28-4d4f...	172.16.20.123	MecaZoneEworks2	Stopped	+
<input type="checkbox"/>	VM-bee0c6d5-0c80-445...	i-4-162-VM	VM-bee0c6d5-0c80-445...	172.16.20.65	MecaZoneEworks2	Stopped	+

legend:

- MECA TUS
- MECA UKIM/FEEIT
- MECA eWorks
- MECA UNED
- MECA INSA
- MECA BME

Project: Default view

Home > MECA instance scheduler >

MECA region instance scheduler

Please see and plan your classroom sessions in the following schedule to reserve instances

< > today Oct 7 – 13, 2018 month week day

	Sun 10/7	Mon 10/8	Tue 10/9	Wed 10/10	Thu 10/11	Fri 10/12	Sat 10/13
06:00							
07:00							
08:00							
09:00							
10:00		10:00 am - 11:30 am Test session					
11:00					11:00 am - 12:00 pm FEEIT classroom session		
12:00		12:00 pm - 02:00 pm TUS classroom session				12:00 pm - 02:00 pm TUS classroom session	
13:00							
14:00				02:00 pm - 04:00 pm FEEIT classroom session			
15:00		03:00 pm - 05:00 pm FEITT classroom session					
16:00							

Project: Default view

Home > MECA instance scheduler >

MECA region instance scheduler

Please see



day

Test session

info instances

i-4-230-VM	Stopped ●
display name	VM-7765d66b-4c01-43a9-9fe2-abff0d4952c9
template	CentOS-7-x86-64-Minimal-1708.iso
i-4-231-VM	Stopped ●
i-4-232-VM	Stopped ●
i-4-233-VM	Stopped ●

[Start instances](#)

Start all virtual machine instances

- Dashboard
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09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00

Project: Default view



[Home](#) > [Instances](#) >

Filter by All

Metrics Add Instance

- Dashboard
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- Global Settings
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- MECA region dashboard
- MECA instance scheduler

<input type="checkbox"/>	Name	Internal name	Display Name	IP Address	Zone Name	State	Quickview
<input type="checkbox"/>	VM-78035fce-8976-4d15...	i-4-233-VM	VM-78035fce-8976-4d15...	172.16.20.133	MecaZoneEworks2	Starting	
<input type="checkbox"/>	VM-425b9814-26ed-462...	i-4-232-VM	VM-425b9814-26ed-462...	172.16.20.145	MecaZoneEworks2	Starting	
<input type="checkbox"/>	VM-b7d6dffc-973f-40da...	i-4-231-VM	VM-b7d6dffc-973f-40da...	172.16.20.140	MecaZoneEworks2	Starting	
<input type="checkbox"/>	VM-7765d66b-4c01-43a...	i-4-230-VM	VM-7765d66b-4c01-43a...	172.16.20.132	MecaZoneEworks2	Running	
<input type="checkbox"/>	CentOS7-MECA-Dashboard	i-8-42-VM	CentOS7-MECA-Dashboard	172.16.20.54	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	UbOnHOST03	i-4-38-VM	UbOnHOST03	172.16.20.67	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	CentOS7-Minimal-Template	i-4-36-VM	CentOS7-Minimal-Template	172.16.20.109	MecaZoneEworks2	Running	
<input type="checkbox"/>	VM-967a230f-7eff-4249...	i-4-168-VM	VM-967a230f-7eff-4249...	172.16.20.59	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	VM-9ce4b2d0-c9fa-4ba0...	i-4-167-VM	VM-9ce4b2d0-c9fa-4ba0...	172.16.20.62	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	VM-12934144-0fee-4eff...	i-4-166-VM	VM-12934144-0fee-4eff...	172.16.20.126	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	VM-16bc352b-29dc-432...	i-4-165-VM	VM-16bc352b-29dc-432...	172.16.20.51	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	VM-a401cd47-05ce-404...	i-4-164-VM	VM-a401cd47-05ce-404...	172.16.20.142	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	VM-420f80f2-1c28-4d4f...	i-4-163-VM	VM-420f80f2-1c28-4d4f...	172.16.20.123	MecaZoneEworks2	Stopped	
<input type="checkbox"/>	VM-bee0c6d5-0c80-445...	i-4-162-VM	VM-bee0c6d5-0c80-445...	172.16.20.65	MecaZoneEworks2	Stopped	

Project: Default view

Home > MECA instance scheduler >

MECA region instance scheduler

Please see



day

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MECA region dashboard

MECA instance scheduler

09:00

10:00

11:00

12:00

13:00

14:00

15:00

16:00

17:00

18:00

10:00

11:00

12:00

13:00

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15:00

16:00

17:00

18:00

10:00

11:00

12:00

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14:00

15:00

16:00

17:00

18:00

Test session

info

instances

i-4-230-VM

Running ●

i-4-231-VM

Running ●

display name

VM-b7d6dff-973f-40da-9f06-bda9c0fc945f

template

CentOS-7-x86-64-Minimal-1708.iso

i-4-232-VM

Running ●

i-4-233-VM

Running ●

Stop instances

Project: Default view

Home > MECA instance scheduler >

MECA region instance scheduler

Please see

Test session

info instances

i-4-230-VM

Running ●

i-4-231-VM

Running ●

display name

VM-b7d6dff-973f-40da-9f06-bda9c0fc945f

CentOS-7-x86-64-Minimal-1708.iso

Running ●

Running ●

Stop instances

```
[root@host02 mecainstancescheduler]# virsh list --all
```

Id	Name	State
1	v-1-VM	running
2	s-2-VM	running
6	i-2-10-VM	running
8	i-4-36-VM	running
10	r-41-VM	running
118	i-4-230-VM	running
119	i-4-232-VM	running
120	i-4-233-VM	running
121	i-4-231-VM	running



MECA instance scheduler

18:00



- **Workspace access**

- How to access VM instances over the network for the students through the regions?

- By Remote Desktop
 - By VNC
 - By TeamViewer

- Can be consumed by

- Thin clients in the university
 - Private computers of students



- **Workspace access example with 18 Windows 7 machines prepared by BME**

The screenshot displays the Apache CloudStack interface. On the left, a sidebar menu includes 'Dashboard', 'Instances', 'Affinity Groups', 'Storage', 'Network', 'Templates', 'Events', 'Projects', 'Accounts', 'Domains', 'Regions', 'Infrastructure', 'Global Settings', 'Service Offerings', and 'MECA region dashboard'. The main content area shows a 'MECA instance scheduler' with a 'MECA region instance scheduler' modal open. The modal has two tabs: 'Info' and 'Instances'. The 'Info' tab shows details for a 'Budapest Workspace Session':

- Start: 2018-12-10 13:00
- End: 2018-12-10 16:00
- Owner: Peter
- Comments: Test of 18 instances with 2 GB RAM, 1 Core, 1 GHz
- Region: MECA-eWorks
- Template: Windows-7-BME-CAD-Template
- Number of Instances: 18

A red arrow points from the 'Number of Instances: 18' field to the 'Start instances' button. The 'Instances' tab shows a list of 18 instances, each with a unique ID and a status indicator (Running or Starting).

Instance ID	Status
i-4-358-VM	Running
i-4-359-VM	Running
i-4-360-VM	Running
i-4-361-VM	Running
i-4-362-VM	Running
i-4-363-VM	Running
i-4-364-VM	Running
i-4-365-VM	Running
i-4-366-VM	Starting
i-4-367-VM	Starting

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www.meca-project.eu/



- **Workspace access example – Remote Desktop and TeamViewer access to machines over the internet:**

The screenshot displays a remote desktop environment. On the left, a web browser window shows the 'Course Entry Point' for the MicroElectronics Cloud Alliance, featuring the e-Learning logo and a list of online courses, including 'Design for Manufacturing of Microsystems'. The desktop background is dark blue with several application icons. A TeamViewer control panel is overlaid in the bottom right corner, showing session controls and a session list. The system tray at the bottom right indicates the time as 13:54 on 07/12/2018.

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Thank you!