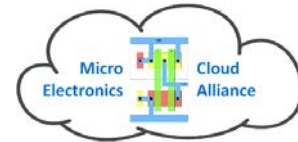




Co-funded by the
Erasmus+ Programme
of the European Union



MECA Project
Training Seminar for Cloudstack installation
Politecnico di Torino
06 - 08 October 2016

in Department of Electronics and Telecommunications
Corso Casteldardo 42/A, 5th Floor Meeting Room

Trainers: Massimo Ruo Roch (POLITO) and Martin Klossek (eWorks)

Objective: To train the Cloud system administrators of the MicroElectronics Cloud system in the Cloudstack installation and site-to-site cloud integration

Target group: developers of hardware and software of Clouds from all partner institutions.

Background: knowledge and skills in computer system administration, server maintenance, computer networking.

Learning outcomes: After the training seminar, the trainees should be able to install Cloudstack 4.8 in their institution and to implement site-to-site cloud integration.

Evaluation: test results of the installation and test of Cloudstack at each partner institution.

Thursday 06, October 2016

14h00-17h00 **Case study 1:** ‘Configuration of the Cloud system at BME’ –
Géczy Attila

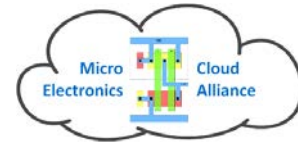
17h00-18h00 **Analysis of problems encountered and suggestions for new
tests** – Massimo Ruo Roch

Friday 07, October 2016

09h30-12h00 **Case study 2:** ‘Configuration of the Cloud system at eWorks’ –
Martin Klossek



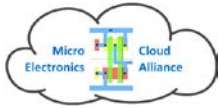
Co-funded by the
Erasmus+ Programme
of the European Union



- 12h00-13h00 **Discussion and analysis of tests in Germany and Hungary**
- 13h00-14h30 Lunch
- 14h30-17h00 **Practical assignments:** NFS server: firewall configuration for
the specific OS at each institution
- 17h00-17h30 **Summary of problems encountered in site-to-site cloud
integration, and suggested solutions**

Saturday 08, October 2016

- 09h30-11h00 **Workshop:** ‘Test and production environment requirements’
- 11h00-11h30 Coffee break
- 11h30-13h00 **Training seminar:** ‘VPN setup between institutions’



MECA PROJECT TRAINING SEMINAR FOR SYSTEM ADMINISTRATORS

MINUTES

Politecnico di Torino, October 6 - 8 2016

Participants

1. Rossen Radonov, TUS Sofia, Bulgaria
2. Martin Klossek, eWORKS, Germany
3. Massimo Ruo Roch, Politecnico di Torino, Italy
4. Risto Chavdarov, UKIM, Macedonia
5. Gabriel Popescu, Giga Electronic Int., Romania
6. Peter Martinek, BME, Hungary
7. Rainer Mihai, Giga Electronic Int., Romania
8. Dragan Stankovski, ATRONIKA, Macedonia

DAY 1: OCTOBER 6TH

Géczy Attila: Configuration of the Cloud system at BME

Presentation of the configuration Case study: CloudStack Architecture

Set up VM with working tools + training course documentation as presentation of VM capability

Set up VM template for Cloudstack

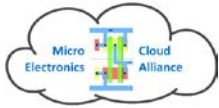
Template based VM generation in the system

- Management server(s)
- Infrastructure hierarchy
- Storage types

Analysis of problems encountered and suggestions for new tests

Resources

- Heavy resources are needed for VMs
- Allocated resources are enough for electronics CAD applications



MECA PROJECT SYSTEM OFFICERS TRAINING EVENT Torino 6th-8th October 2016

- Resources are also enough for course documentation playback (PDF, Video, etc...)

Licensing

- Licensing is possible via the VM, meaning licensed software is able to draw the license allowances from the central servers
- However it is questionable to set up licensed software if it is not present at all partners

Suggestions

- Practical demonstrations, courses, training and practice tools: suggested freeware, open source softwares besides available documentations and other media.
- In the suggested topics (electronics technology, circuit design, etc.) freeware alternatives are available to conduct a professional training session.
- Software, which are legally available for all partners, could also be implemented to the system.

DAY 2: OCTOBER 7TH

Martin Klossek: Configuration of the Cloud system at eWorks

Martin Klossek describes the results of the configuration of the system at eWorks.

PoliTo and eWorks prepared shared installation:

- 1 Basic zone in PoliTO

- 1 Basic zone in eWorks

- Redundant management server (1 per site)

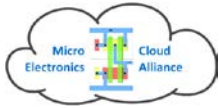
- Redundant database: Master in PoliTO, Backup in eWorks

Encrypt the management traffic between the different zones / data centers

Domain feature in CloudStack: Hierarchical user levels through domains, e. g. for departments inside of institutions. "Projects" in CloudStack are for grouping people

Use subdomains of meca-project.eu for the project, e. g. server1.polito.meca-project.eu or machine4.bme.meca-project.eu

All trainees participate in the case study on problems encountered in Cloudstack installation, and suggested solutions:



MECA PROJECT SYSTEM OFFICERS TRAINING EVENT Torino 6th-8th October 2016

- Even slight mismatch in OS and software version can lead to problems. Recommendation is to strictly adhere to documentation requirements.
- Sometimes template creation is very slow. BME reports ~1 hour. Bottlenecks must be identified in network paths and in I/O performance.
- Security groups function is not clear. Specifically, it's not clear that default security group has a 'block all' rule. A better description of institution and top-of-rack firewalls role must be defined, too, and given to implementers.

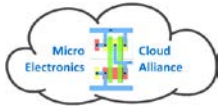
Discussion and analysis of tests in Germany and Hungary

- PfSense system is not reliable when run in a VM guest, due to known (now) kernel bugs.
- Possible solutions are:
 - Installation of PfSense on a bare metal firewall.
 - Installation of a Linux firewall supporting OpenVPN.
 - pfSense VM for firewalling + Linux VM as OpenVPN server/client.
 - Different cloud architecture, with reduced performances and features, but easier to deploy: each institution has a single 'region' of the overall cloud.

Practical assignments: NFS server: firewall configuration for the specific OS at each institution

Massimo Ruo Roch: Summary of problems encountered in site-to-site cloud integration, and suggested solutions

- Heavy resources are needed for VMs
- Allocated resources are enough for electronics CAD applications
- Resources are also enough for course documentation playback (PDF, Video, etc...)
- PfSense system is not reliable when run in a VM guest, due to known (now) kernel bugs.



DAY 3: OCTOBER 8TH

Workshop: 'Test and production environment requirements'

Discussion and planning the test and production environment requirements:

ACTIONS:

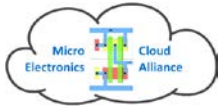
- VPN setup between institutions
- Mysql data replication, possibly in a master/master configuration.
- Performance assessment, to detail hardware and software architecture costs, related to number of students/VMs/courses.
- Definition of test and production environment requirements.
- Cloudstack region evaluation.
- Possible test of an existing PaaS solution (Cloudify).
- Creation of examples of network topologies for different needs, i.e. classroom course server to access CAD tools, Moodle instance, etc.
-

Training seminar: 'VPN setup between institutions'

- NFS server: firewall configuration must be adapted to NFS software used. Specifically, If local firewall is enabled, then static ports must be assigned to NFS services. Standard configuration uses portmap service at a static port, and mountd/lockd/statd at dynamic ones. This situation is not supported, and changes must be applied to /etc/sysconfig/nfs file.
- NFS server: performance of Microsoft Windows virtualized guests is very poor in accessing the disk. No definitive solution is up to know available. A possible one is the usage of paravirtualized (virtio) drivers in Windows guest.

Recommendation: Firewall in front of CloudStack to avoid conflicts with the other organizations/departments

- Free firewall: pfSense (low system requirements, e. g. 512 MB RAM), can be installed as virtual appliance or one can buy a physical appliance. Server Load Balancing is possible. IPsec and OpenVPN is built-in
- If possible the management server and the NFS should be on separate servers.



Summary and conclusions

Summary of problems encountered in Cloudstack installation, and suggested solutions

The following problems has been identified during installation of Cloudstack 4.8 in partner's premises:

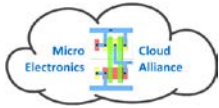
- Even slight mismatch in OS and software version can lead to problems. Recommendation is to strictly adhere to documentation requirements.
- NFS server: firewall configuration must be adapted to NFS software used. Specifically, If local firewall is enabled, then static ports must be assigned to NFS services. Standard configuration uses portmap service at a static port, and mountd/lockd/statd at dynamic ones. This situation is not supported, and changes must be applied to `/etc/sysconfig/nfs` file.
- NFS server: performance of Microsoft Windows virtualized guests is very poor in accessing the disk. No definitive solution is up to know available. A possible one is the usage of paravirtualized (virtio) drivers in Windows guest.
- Sometimes template creation is very slow. BME reports ~1 hour. Bottlenecks must be identified in network paths and in I/O performance.
- Security groups function is not clear. Specifically, it's not clear that default security group has a 'block all' rule. A better description of institution and top-of-rack firewalls role must be defined, too, and given to implementers.

Summary of problems encountered in site-to-site cloud integration, and suggested solutions

- PfSense system is not reliable when run in a VM guest, due to known (now) kernel bugs.
- Possible solutions are:
 - Installation of PfSense on a bare metal firewall.
 - Installation of a Linux firewall supporting OpenVPN.
 - pfSense VM for firewalling + Linux VM as OpenVPN server/client.
 - Different cloud architecture, with reduced performances and features, but easier to deploy: each institution has a single 'region' of the overall cloud.

Future steps:

- VPN setup between institutions
- Mysql data replication, possibly in a master/master configuration.



MECA PROJECT SYSTEM OFFICERS TRAINING EVENT Torino 6th-8th October 2016

- Performance assessment, to detail hardware and software architecture costs, related to number of students/VMs/courses.
- Definition of test and production environment requirements.
- Cloudstack region evaluation.
- Possible test of an existing PaaS solution (Cloudify).
- Creation of examples of network topologies for different needs, i.e. classroom course server to access CAD tools, Moodle instance, etc.

NEXT Training for implementation of mClouds: TU-Berlin, Germany, 16-17 March 2017.