

**Polytechnic University of Tirana
Faculty of Information Technology
Computer Engineering Department**

**11TH WORKSHOP ON
“SOFTWARE ENGINEERING EDUCATION AND REVERSE
ENGINEERING”**

MASTER THESIS PRESENTATION

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“CPU, MEMORY, I/O DEVICES AND NETWORK
PERFORMANCE EVALUATION IN
A VIRTUAL CLOUD COMPUTING ENVIRONMENT”



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Development field & Motivation(1)

The Next Gen = Cloud Computing

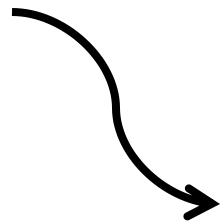


Development field & Motivation(2)

Cloud computing --- new technique

- *Dynamic services*
- *...when users need them (On-Demand self service)*
- *Economical benefits*
- *Broad network access*
- *Measured(monitored) Service*

Most of a cloud uses



machine **virtualization**

Development field & Motivation(3)

Virtualization Technology --- improvements in:

- ➡ *Resource usage*
- ➡ *Cost minimization*
- ➡ *Server management (easier process)*
- ➡ *Increases the security in cloud computing
(client virtual machines, cloud infrastructure components)*

Previous works in CC performance evaluation

- Research in virtualization overhead measurements for platforms such as: XEN, KVM and VMware ESX (*Apparao et Al, 2006; Menon et Al, 2005; Jianhua et Al, 2008; Shan et Al, 2009; VMware 2007*).

Thanks to them: bugs have been detected and corrected while network performance is improved.

- A comparison of CC Virtualized environments: Windows XP vs Fedora 8

- **Objectives** --- Other performance evaluations

Quick Overview

C. Computing & Virtualization

Cloud Computing architecture:

- ➡ IaaS (Infrastructure as a Service)
- ➡ PaaS (Platform as a Service)
- ➡ SaaS (Software as a Service)

Virtualization types:

- ➡ Full Virtualization
- ➡ Paravirtualization
- ➡ Hardware Assisted Virtualization

Thesis goal

(Evaluating the performance of the 'couple')

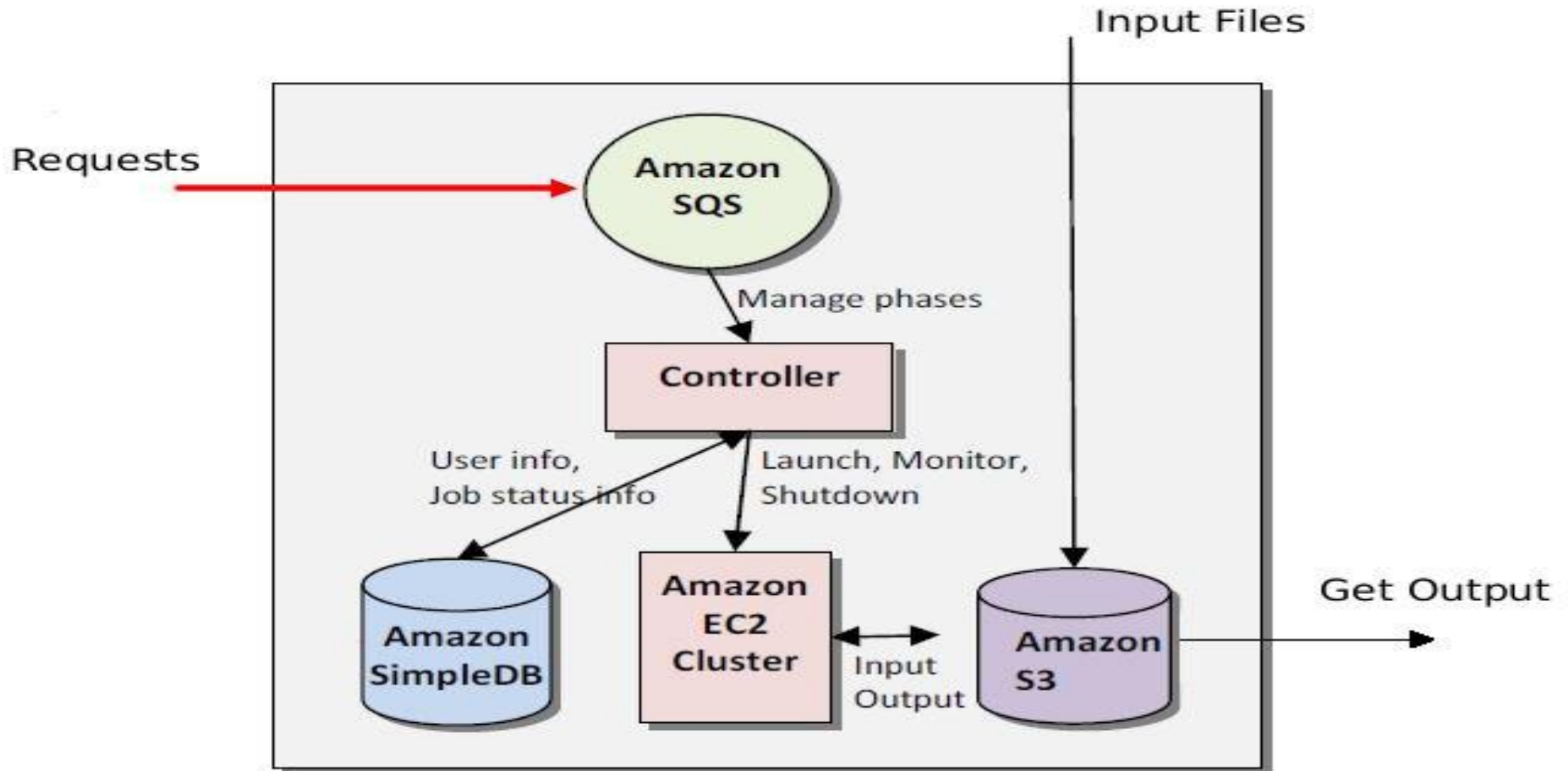
- Implementing 2 clouds, private and public
- Performing different evaluations for the two types of cloud, trying to test parameters like CPU, network, memory, I/O devices.
- Interpreting the results

Project & Methodology(1)

- ➡ Design: Public cloud (Amazon),
Private cloud(Open Nebula)
- ➡ OS: Linux, Windows XP
- ➡ Virtualization: HVM, Paravirtualization
- ➡ Xen Virtual Machine Monitor
- ➡ Instances(Micro, Medium, High)
- ➡ Software testing tools: Hdparm, Iperf, Geekbench, PerformanceTest 7.0

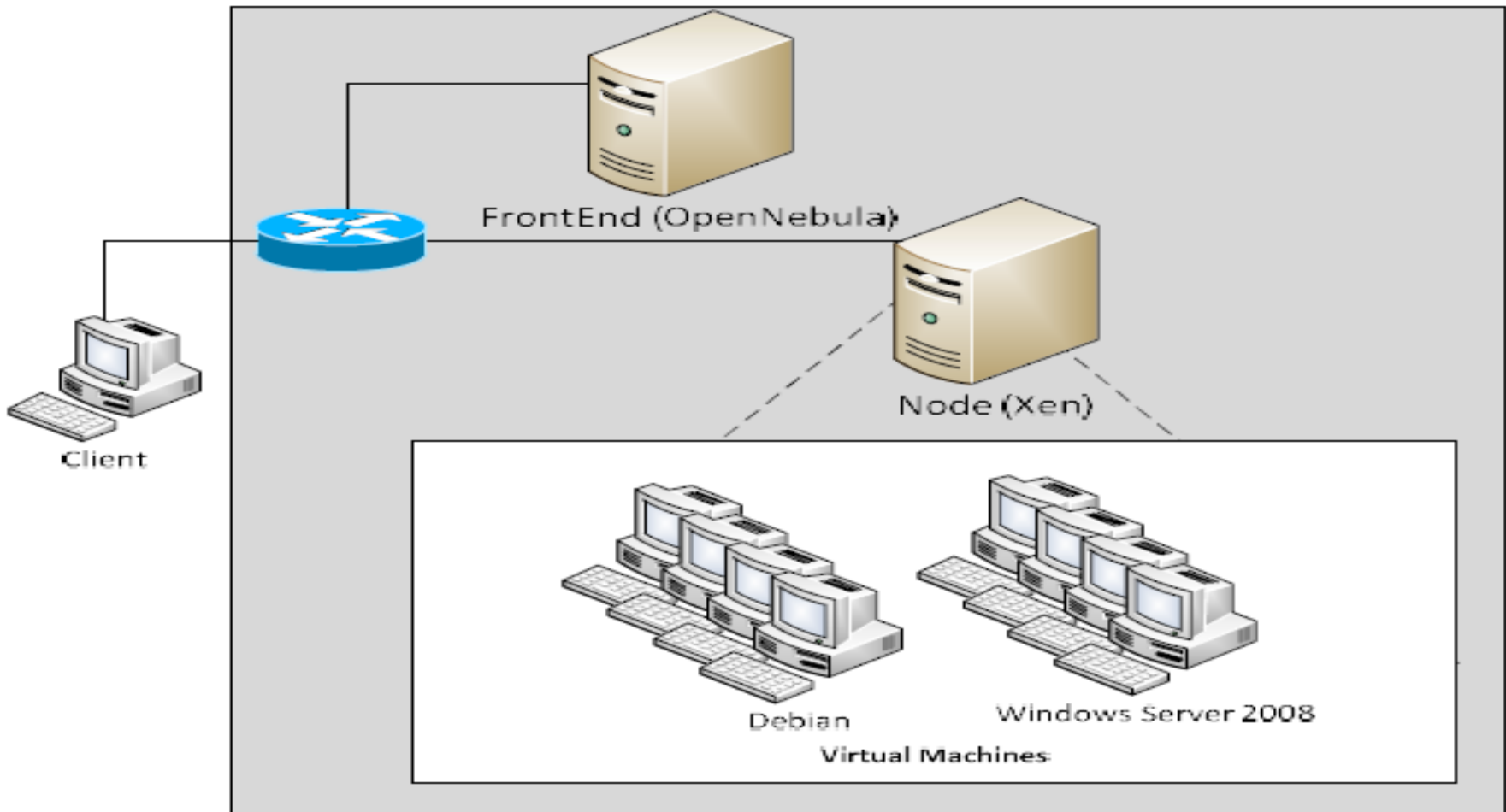
Project & Methodology(2)

Amazon public cloud



Project & Methodology(3)

Open Nebula private cloud



Implementation Issues

Connecting to Amazon

➡ (micro instance --- testing)

Implementing the private cloud

➡ (front-end and the node)

Performance testing:

1. CPU performance(Using Geekbench)
 2. Network performance(iperf)
 3. Hard-Drive performance(hdParm, PassMark Performance Test 7.0)
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Conclusions(1)

- The aim of this project was to evaluate the performances of virtualization with cloud Computing
- There have been implemented different scenarios of virtualized clouds
- For evaluating the aimed performance features there have been used a lot of assisting softwares

Conclusions(2)

- According to previous performance evaluations, and some personal tests:
 - Paravirtualization tends to have performance almost as good as the native performances
 - Also the researches permit to outline the strengths and weaknesses of the different technologies used in cloud computing
 - Solutions are found to overcome the weaknesses
 - Also cloud computing and virtualization became more and more popular
 - Linux performances was better because Linux was using paravirtualization while Windows was using HVM

Questions & Suggestions?



THANK YOU !