

HKBU-UNIPG Exchange Programme
Summer 2012

OPEN CLOUD

Valentina FRANZONI

Open Cloud

Let's take a look into the Cloud...

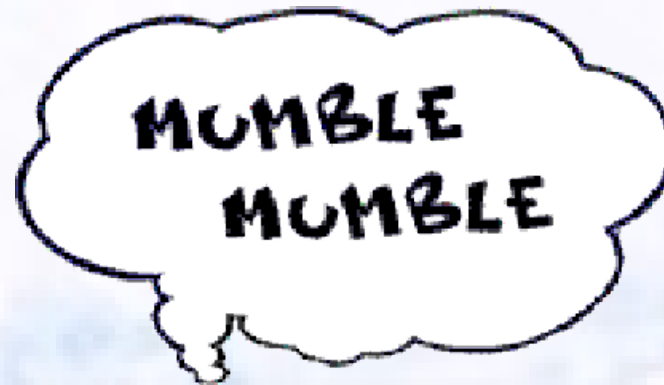


<http://mindfulbalance.files.wordpress.com/2011/10/looking-at-clouds.jpg>

Open Cloud

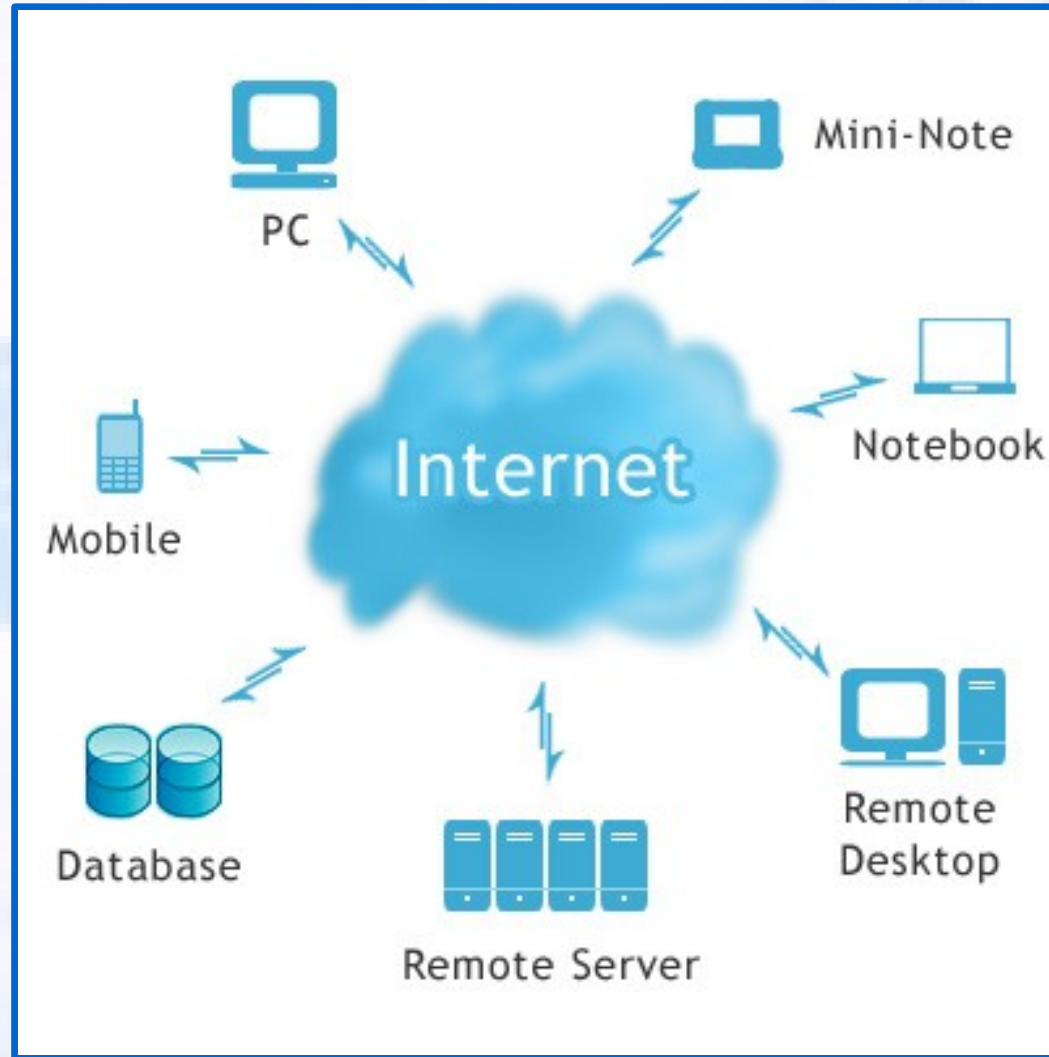
“OPEN” + “CLOUD”...

- What does “Cloud” mean?



Cloud = Internet

<http://www.seoguru.it/blog/wp-content/uploads/2010/07/cloudcomputing.jpg>



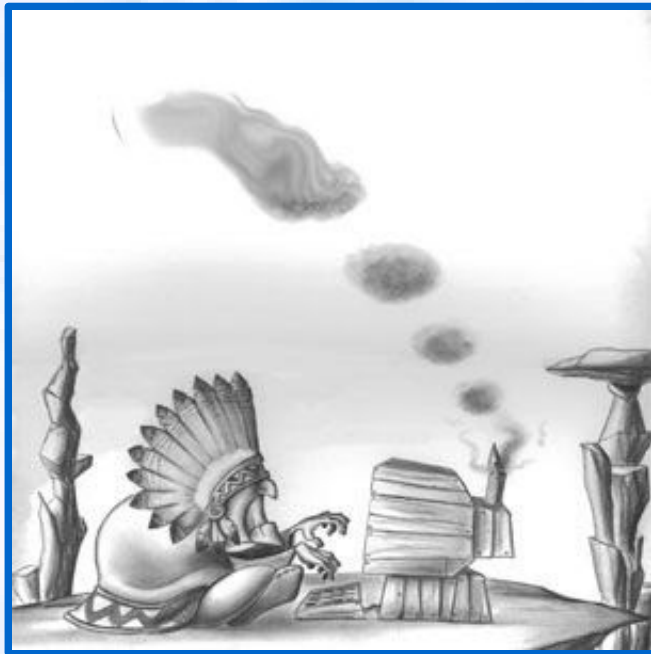
Cloud = Cloud Computing

<http://www.teaminformatica.ch/images/cloud.jpg>



Cloud Computing

What does “Cloud Computing” mean, now?



Cloud computing means...



Mobile Cloud

Speakers

Michele Lepri
(<http://michelelepri.blogspot.com>)

Emanuele Palazzetti
(<http://www.emanuelepalazzetti.eu>)

4 July 2012

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Mobile Cloud

The cloud in the mobile world



- The cloud offers an invisible infrastructure capable to deliver some services (SaaS)
- Some services you are using on a smartphone, are based on a cloud service (ex: email, storing, etc...)
- If the cloud handle user data, all his information can be accessed everywhere and every time
- Documents, emails, images and many other data types, can be accessed even if mobile devices get broken or get lost



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INVISIBLE INFRASTRUCTURE

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Mobile Cloud

The cloud in the mobile world



- The cloud offers high computational power so it can deliver some special services not usable in other way
- You can use cloud map application to calculate quickly the shortest path from place A to place B
- A device can record someone speaking in a different language and then send all raw data to a cloud service that takes care of translation (online translation is still in beta...but not for a while)
- Cloud companies ensure availability, integrity, confidence and backup operation; the "only" problem is that you must trust them (warning: LinkedIn)



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SPECIAL SERVICES AND POWER

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BUT YOU MUST TRUST!!

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Mobile Cloud

Developing for the cloud



- A developer can build applications using only hardware and data resources offered by a single device... it can be a huge limit!
- Some services cannot exist without an infrastructure that collect and share data to everyone who is "connected" (ex: FourSquare or Twitter)
- Cloud companies offer their infrastructure or platform as a service (ex: Amazon, Google App Engine, Red Hat OpenShift etc...)
- Sometimes, we should build apps that use data or computational power offered by a cloud (ex: Google Maps)
- We can build advanced mobile application that use the power of the cloud!



Mobile Cloud

Developing for the cloud

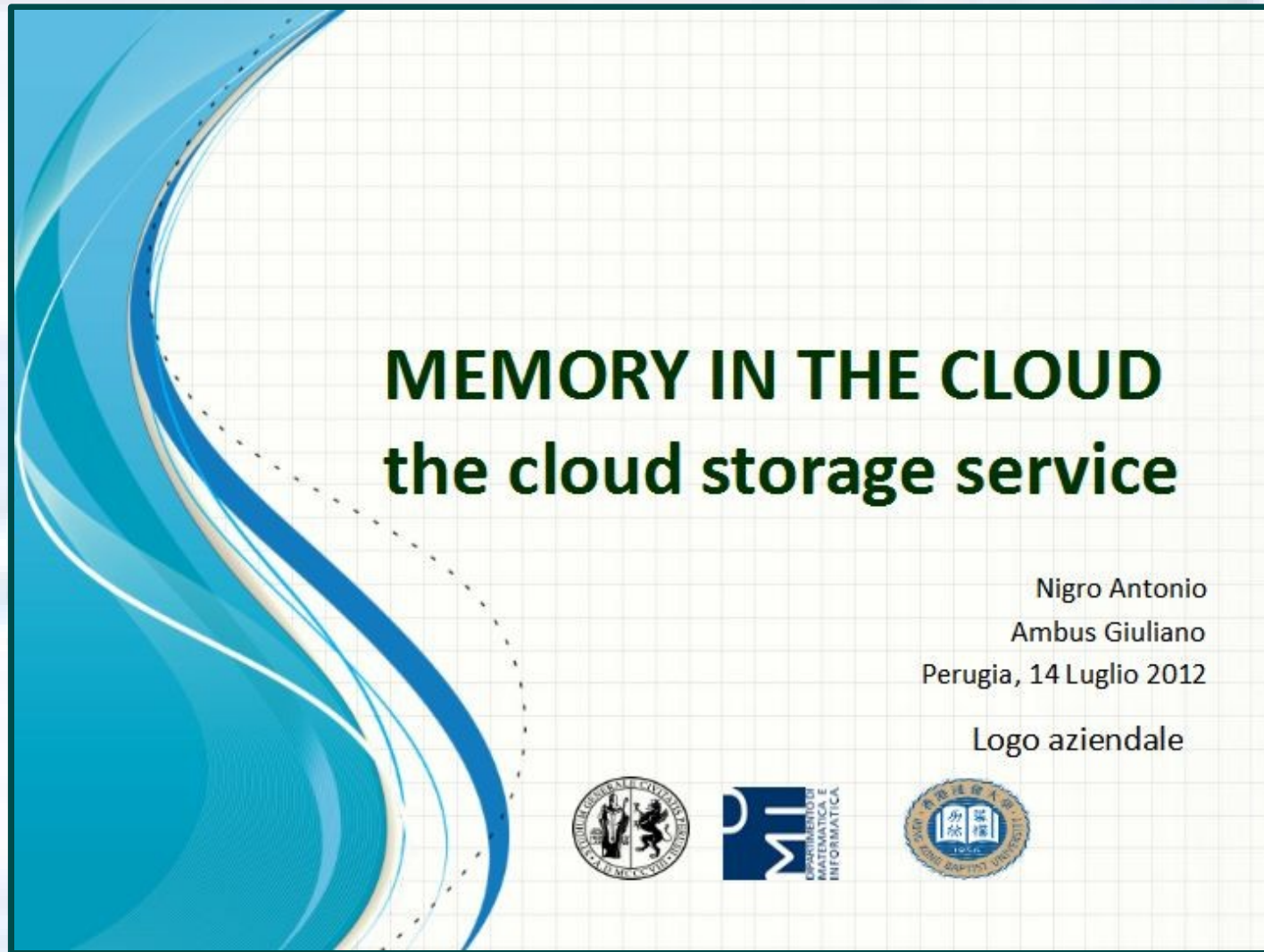


COLLECT AND SHARE DATA

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Cloud computing means...



Memory in the Cloud

Cloud Computing

The delivery of computing and storage capacity, as a service to a heterogeneous community of end-recipients

KEY WORDS

- Internet
- Store
- Compute
- Data



Memory in the Cloud

Cloud Computing

HETEROGENEOUS
COMMUNITY

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KEY WORDS

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Memory in the Cloud

What's new ?

- **Online Backup**
- **Your Music in the cloud**
- **Sharing files**
- **Collaboration**
- **Synchronizing profiles (or devices) and mailboxes**
- **Use as External Hard Drives**
- **Access files from third party systems**

Memory in the Cloud

What's new ?

ONLINE ACCESS

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Memory in the Cloud

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**COLLABORATIVE
SHARING**

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ACCESS FROM
THIRD PARTY
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Memory in the Cloud

Cloud Storage characteristics : Control

A customer's ability to control and manage how his or her data is stored and the costs associated with it is important.

Numerous cloud storage providers implement controls that give users greater control over their costs.

- Amazon implements Reduced Redundancy Storage (RRS) to provide users with means of minimizing overall storage costs. Data is replicated within the Amazon S3 infrastructure, but with RRS, the data is replicated fewer times with the possibility for data loss

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MUST PAY TO TAKE CONTROL

Cloud computing means...



Open Grid

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Part of the slides came from:

- plenary lecture of Isabel Capos Plasencia at ICCSA08 Conference June – July 2008, Perugia, Italy
- Grid Security presentation of Rachana Ananthakrishnan, Argonne National Lab



Open Grid

1. Internet computing

Idea: many idle PCs on the Internet

Can perform other computations while not being used

“Cycle scavenging” – rely on getting free time on other people’s computers

Example: SETI@home

What are advantages/disadvantages of cycle scavenging?

EPSOCC, Perugia (Italy), July 2012

Open Grid

1. Internet computing

SHARING COMPUTATIONAL CAPABILITIES

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Open Grid

1. Collaborative computing

Enable shared use of data archives and simulations

Examples:

Collaborative exploration of large geophysical data sets

Challenges:

Real-time demands of interactive applications

Rich variety of interactions

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Open Grid

Authorization establishes rights to do actions

- What can a particular identity do?

Examples:

- ☐ Are you allowed to read this file?
- ☐ Are you allowed to run a job on this machine?
- ☐ Unix read/write/execute permissions
- Must authenticate first
 - ☐ Authentication != authorization

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Open Grid

Authorization establishes rights to do actions

**AUTHENTICATION NEEDED
(AND SUFFICIENT)**

- What can a particular identity do?

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The “Cloud” is...

An *invisible infrastructure*

to which *heterogeneous communities* can
access at anytime from *everywhere*

to special *online services*, or to a
collaborative *sharing* of computational
power or data archives,

trusting third parties who collect data and
paying to take more control of such data.

Cloud Security

The main problem of Cloud Computing is how to secure your data with respect to:

- ➔ ***Integrity***
- ➔ ***Privacy***
- ➔ ***Availability***

both for storing and for delivering information, with many issues about *authentication, encryption, authorization, replication of data*, so on and so forth!

Psychiatric Help

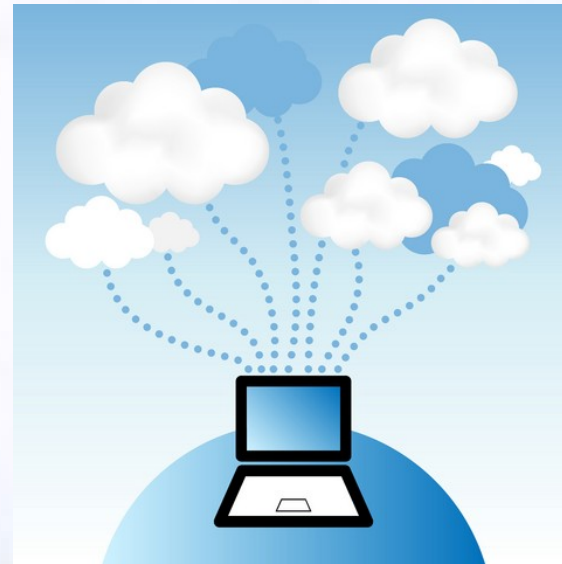
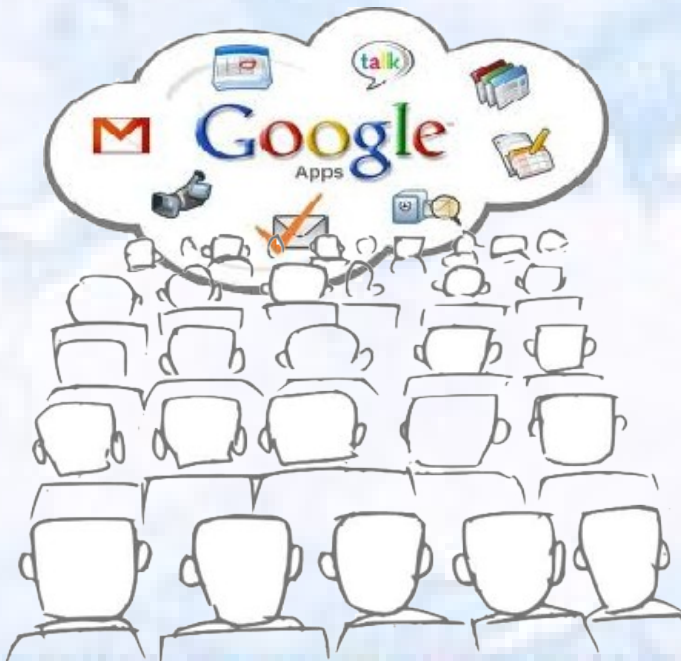
But how is the Cloud different from “usual” networking about security?



The Cloud is different

Your data are **remotely stored**.

You **lose perception and control** on **INFORMATION** about yourself and others.



The Cloud is different

More connections with more devices
means more vulnerabilities.



What if you lose your mobile device?



Are you sure that you can **stop all old connections** that you left open on your cloud services?

Are your private data really private?

Are you sure that your data are not indexed and shared in search engines?



4. PROPRIETARY RIGHTS

Google's Rights

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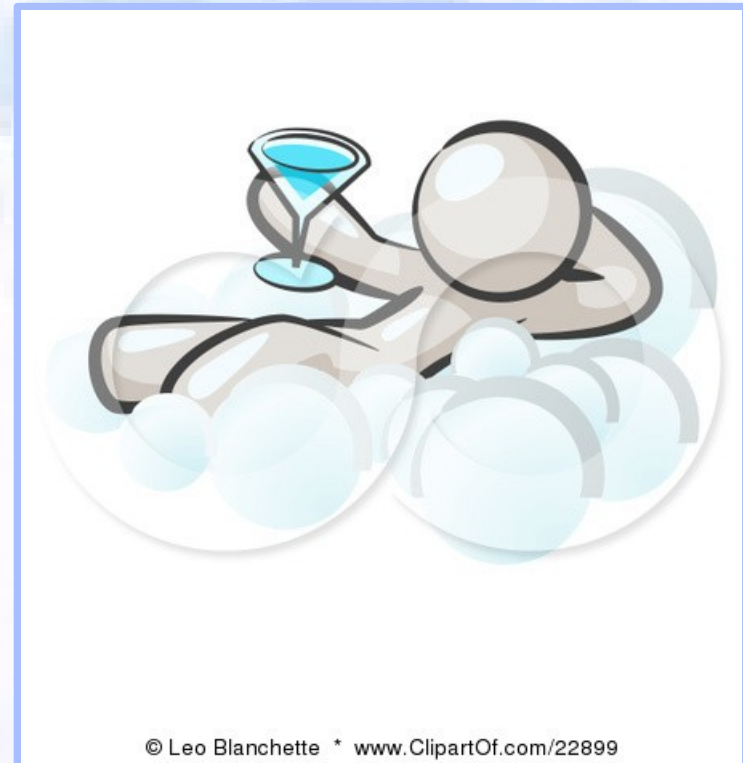
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Cloud developing

Are you sure that your Cloud services are **free of bugs, or backdoors** by evil programmers? Are you really safe in your Cloud?



Control the code, control the world.

Pay more = Control more

But you never really take control of the Cloud
(uhm... foggy!)

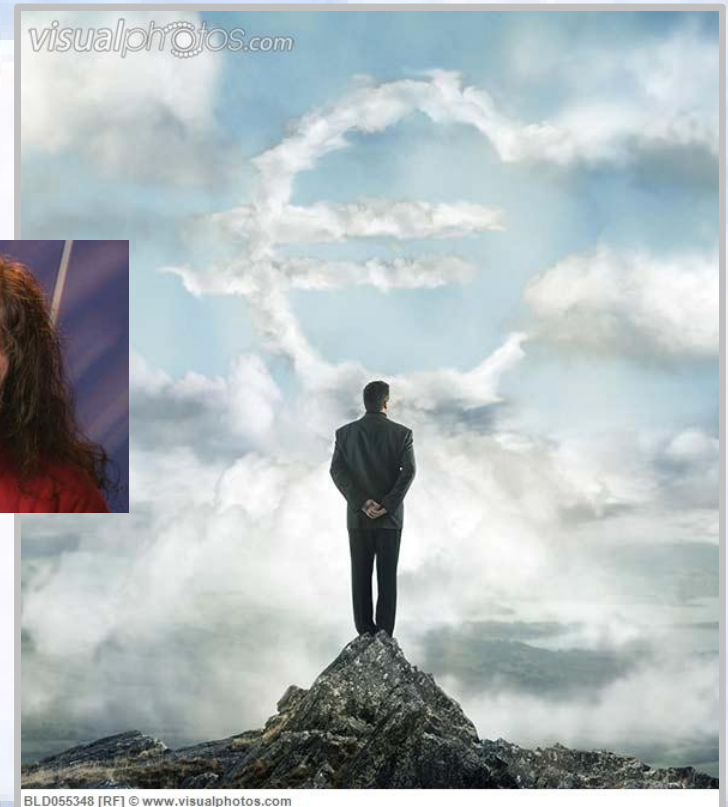
Wise man say only fools rush in

Cloud = Evil

and

Cloud is *“Worse than stupidity.”*

(Richard Stallman, 2008)

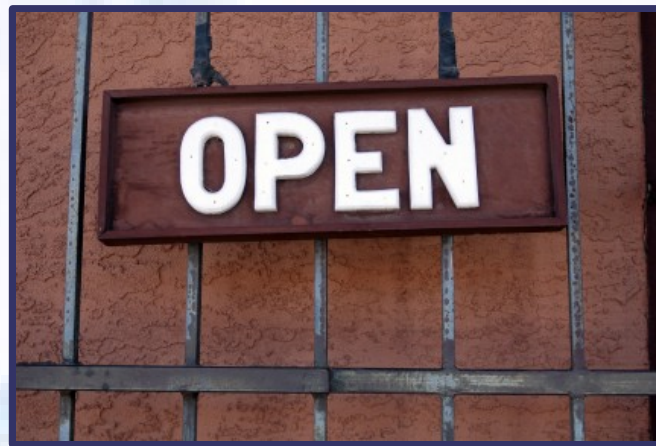


Open Cloud

And that's when the “Open” part comes:

“OPEN” + “CLOUD”...

- What does “Open” mean?

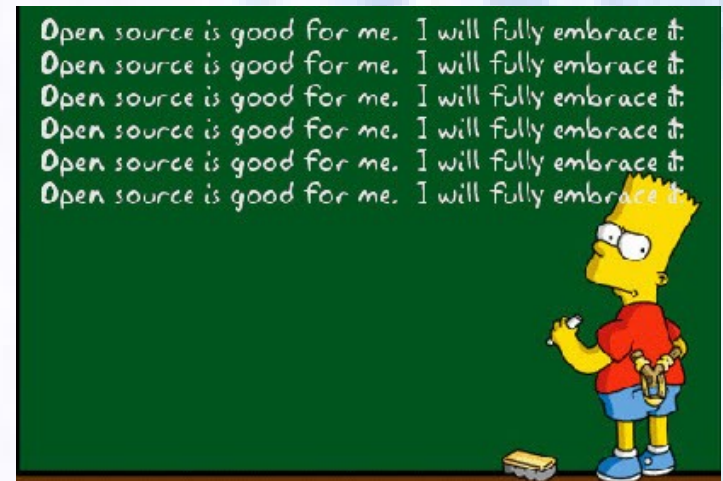


Open Cloud

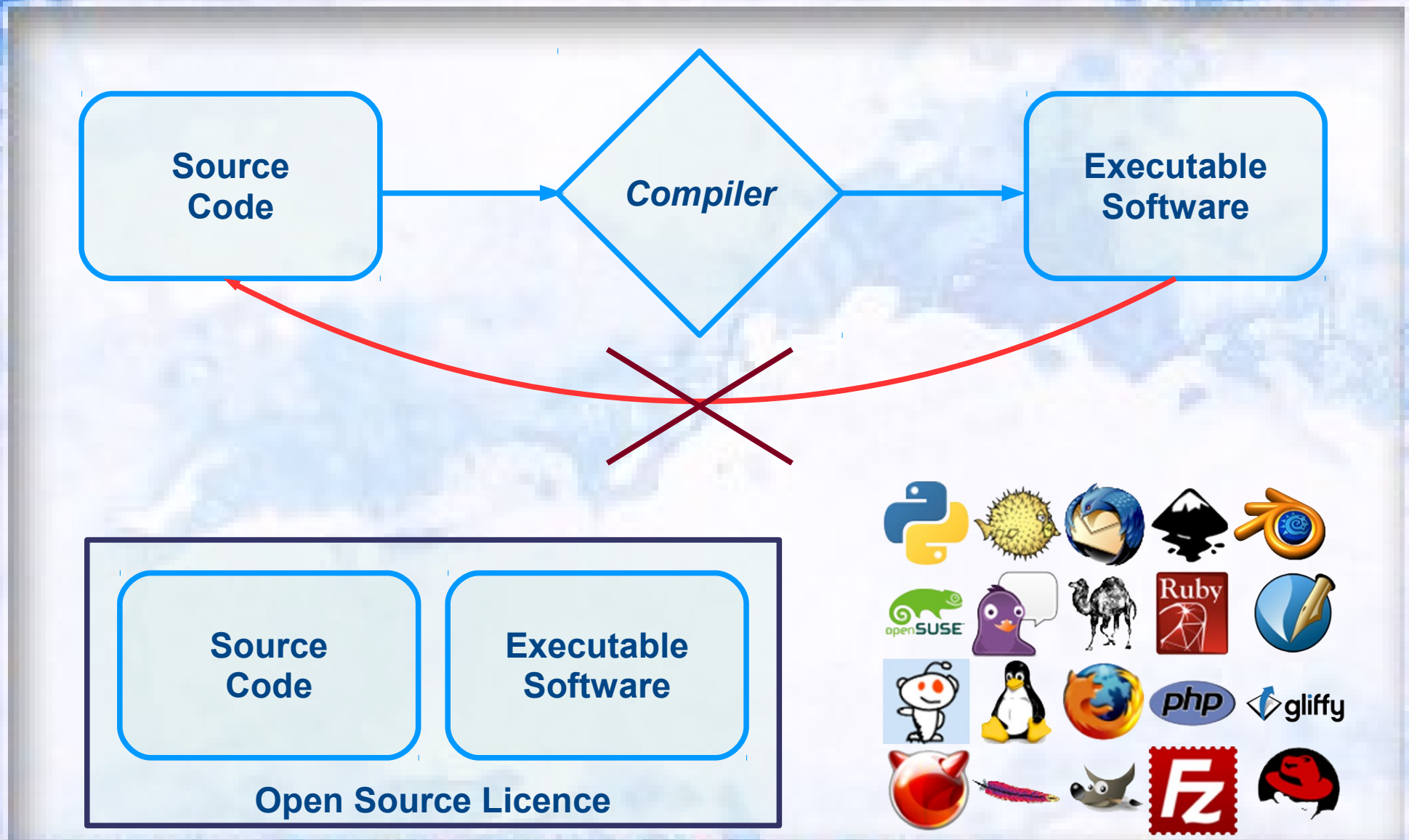
Open = FLOSS

(Free Libre Open Source Software)

We are dreaming
about a new Cloud
where you have
full control of the software
used to manage your data...
for free!



Open Source



The Four “*Freedom*s” of FLOSS

- ☆ *Freedom 0*: The **freedom to run** the program for any purpose.
- ☆ *Freedom 1*: The **freedom to study** how the program works, and change it to make it do what you wish.
- ☆ *Freedom 2*: The **freedom to redistribute** copies so you can help your neighbor.
- ☆ *Freedom 3*: The **freedom to improve** the program, and release your improvements (and modified versions in general) to the public, so that the whole community benefits.

Linus' Law

"Given enough eyeballs, all bugs are shallow"

(Eric Raymond)

Every motivation
that makes a man do something
can be classified under:

- I. "entertainment"
- II. "social life"
- III. "survival"



Progress is defined as reaching a higher category.

(Linus Torvalds)

Advantages of Open Source

- **Control** is moved from single companies or developers to **EVERYONE**: ordinary citizen approaching it as a group.
- Giving information to the public, they will all be engaged in helping, both for **progress** and **security**.
- **Education** to legality and fair use of the shared resources.

Solutions for Open Cloud

- **Choose** Open Source Software
- **Develop** Open Source Software
- **Use** pre-provided Open Source solutions for Cloud Computing, such as ***Debian 7.0*** aka “*Wheezy*”



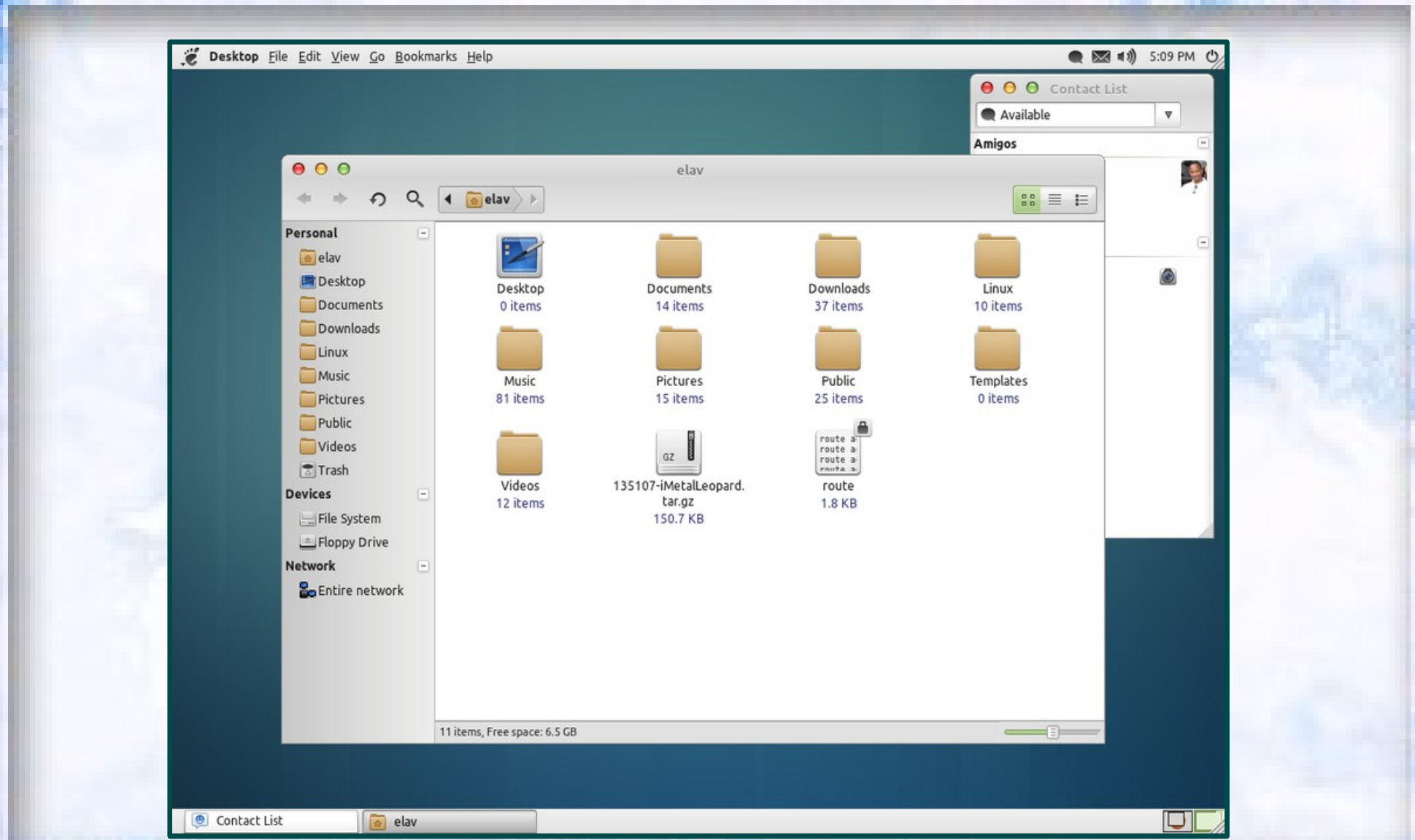
Debian

The Debian Project was founded in 1993 to be a truly free community project. Since then the project has grown to be one of the largest and most influential open source projects.

Available in 70 languages, and supporting a huge range of computer types, Debian calls itself the “*universal operating system*”.

<http://www.debian.org>

Debian Wheezy screenshot



Debian Wheezy



<http://wiki.debian.org/OpenStackHowto>

OpenStack

Open source cloud OS for both public and private clouds, enables businesses to manage computers, storage, and networking resources via a self-service portal and APIs on standard hardware at massive

xcp-xapi
nova-xcp-plugin

Xen Cloud Platform

Delivers an enterprise-ready server virtualization and cloud computing platform. XCP integrates with the following cloud orchestration stacks: CloudStack, OpenNebula and OpenStack.

scale.

Valentina FRANZONI

“Open Cloud”



Debian Wheezy

Debian is the first Linux distribution to contain *XCP packages*. Until now, it was only possible to use XCP in Linux appliances within a tightly controlled environment. In Debian Wheezy was changed how users interact with XCP, providing much more **flexibility** and enabling anybody to use Debian as a *XCP Dom0* kernel. This enables Debian users to build cloud services based on the leading **Free Software virtualization platform** that is powering some of the largest clouds in production today.

A new Cloud

The time to prepare for a new way of thinking the Cloud is now...

...are you ready?





Hong Kong Baptist University



Università degli Studi di Perugia

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