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# Okeanos IaaS

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## Description of the Work

The goal of the Okeanos project is to deliver a production quality IaaS. GRNET operates a working alpha version since July 2011; the alpha offering comprises 350 VMs and 200 users.

In order to reach its goals, Okeanos is a a jigsaw puzzle of many pieces: the UI part, an API, an Image Registry, a VM management component, Networking facilities, Storage, Monitoring, Identity Management, Crediting, Billing, Issue Handling, and Helpdesk operation. It goes beyond commercial IaaS providers in several ways: Amazon EC2, and comparable commercial offerings, are not an end-user service, while Okeanos is designed to be used by people with little computer experience. At the same time it aims to meet the needs of advanced users in technical departments by offering persistent, long-term servers with custom networking capabilities.

The software underlying Okeanos, called Synnefo, is a custom cloud management software with a Google Ganeti backend. Ganeti was chosen because GRNET tries not to re-invent the wheel, when possible; Ganeti is a scalable and proven software infrastructure, and GRNET has already long experience with Ganeti, using it to provide VMs to Network Operation Centres. GRNET is also involved in Ganeti development, and contributes patches upstream.

Okeanos has been developed, and is designed to operate, on commodity hardware. It implements the Open-Stack Compute API v. 1.1, with custom extensions whenever necessary.

## Conclusions

We have seen that it is possible to develop in-house a stable, scalable, and user-friendly IaaS, based on open standards. We will offer Okeanos to the whole Greek research and academic community, while also giving it under an open (BSD 2-clause) license.

Moreover, Okeanos, and its online storage counterpart, Pithos, can used as the basis of a series of other, higher level services. We are in the process of designing and developing novel PaaS and SaaS based on Okeanos and Pithos. We are also exploring the use of Okeanos for established user groups (like EGI User Communities).

## Impact

Okeanos impacts on all aspects of virtualized environments: computing, networking, VM storage, and images.

Users have access to VMs powered by KVM, running Linux and MS-Windows guests on Debian hosts and using Google Ganeti for VM cluster management. The VMs are accessible by the end-user over the Web or programmatically (OpenStack Compute v. 1.1). Users have full control over their VMs: they can create new ones, start them, shutdown, reboot, and destroy them. For the configuration of their VMs they can select number of CPUs, size of RAM and system disk, and operating system from pre-defined Images including popular Linux distros (Fedora, Debian, Ubuntu) and MS-Windows Server 2008 R2. There is an Out-of-Band console over VNC for troubleshooting. The REST API for VM management, being OpenStack Compute v. 1.1 compatible, can interoperate with 3rd party tools and client libraries. GRNET has added custom extensions for

yet-unsupported functionality. It is a Python and Django implementation. The web UI is written in Javascript / jQuery, and is just another API client; in fact, all UI operations happen over the API.

The networking functionality includes dual IPv4/IPv6 connectivity for each VM, easy, platform-provided fire-walling either through an array of pre-configured firewall profiles, or through a roll-your-own firewall inside the VM. Users may create multiple private, virtual L2 networks, so that they construct arbitrary network topologies (e.g., deploy VMs in multi-tier configurations). The functionality is exported all the way to the API and the UI.

At the current stage, IaaS storage is via redundant storage based on DRDB. VMs survive node downtime or failure. GRNET is testing reliable distributed storage over RADOS, combined with custom software for snapshotting and cloning.

Okeanos allows users to use untrusted images. The host cannot touch user-provided data.

## URL

https://okeanos.grnet.gr
https://code.grnet.gr/projects/synnefo
https://code.grnet.gr/projects/pithos

## Overview (For the conference guide)

Okeanos is an IaaS offering virtualized computing resources. It is developed by GRNET (the Greek Research and Technology Network), to be offered to the whole Greek Research and Academic community. The software powering Okeanos is available via an open source license.

Okeanos offers to its users, through a simple web-based GUI, access to Virtual Machines, Virtual Ethernets, Virtual Disks, and Virtual Firewalls. Okeanos was conceived to offer its users easy and secure access to GR-NET's datacentres, focusing on user friendliness and simplicity, while being able to scale up to the thousands (of Virtual Machines, users, terabytes of storage).

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