

Cloud Computing Communications

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#1

ECO-CLOUD FNR Project

- Objective
 - Energy-efficient management of **communications in cloud computing**
 - Novel solutions in **(a)** network hardware (switches, routers and links), **(b)** data center communication systems, and **(c)** communication protocols.

- FNR funding 400K euro, started in June 2013



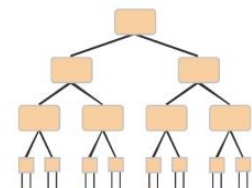
- Partners

- University of Luxembourg
- University of Sydney
- Tri-ICT



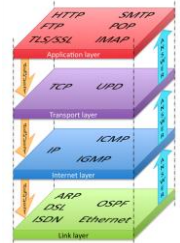
Objectives and Work Packages

- WP1: Energy-Efficient Metrics and Network Traffic Analysis
- WP2: Energy-Efficient Network Hardware
 - Energy proportional architectures for network switches
 - Integration of network hardware and communication protocols
- WP3: Energy-Efficient Data Center Communication System
 - Communication-aware models of cloud computing systems
 - Energy-efficient network-aware resource allocation
 - Multi-objective optimization



Objectives and Work Packages

- WP4: Energy-Efficient Communication Protocols
 - Energy efficiency of TCP/IP protocols
 - Energy-efficient protocol stack (ECO-stack)
- WP5: ECO-CLOUD Simulation Toolkit
 - ECO-CLOUD simulation toolkit software
 - Software prototypes and benchmarking results



#2



Greencloud - The green cloud simulator

Cloud Computing Simulator

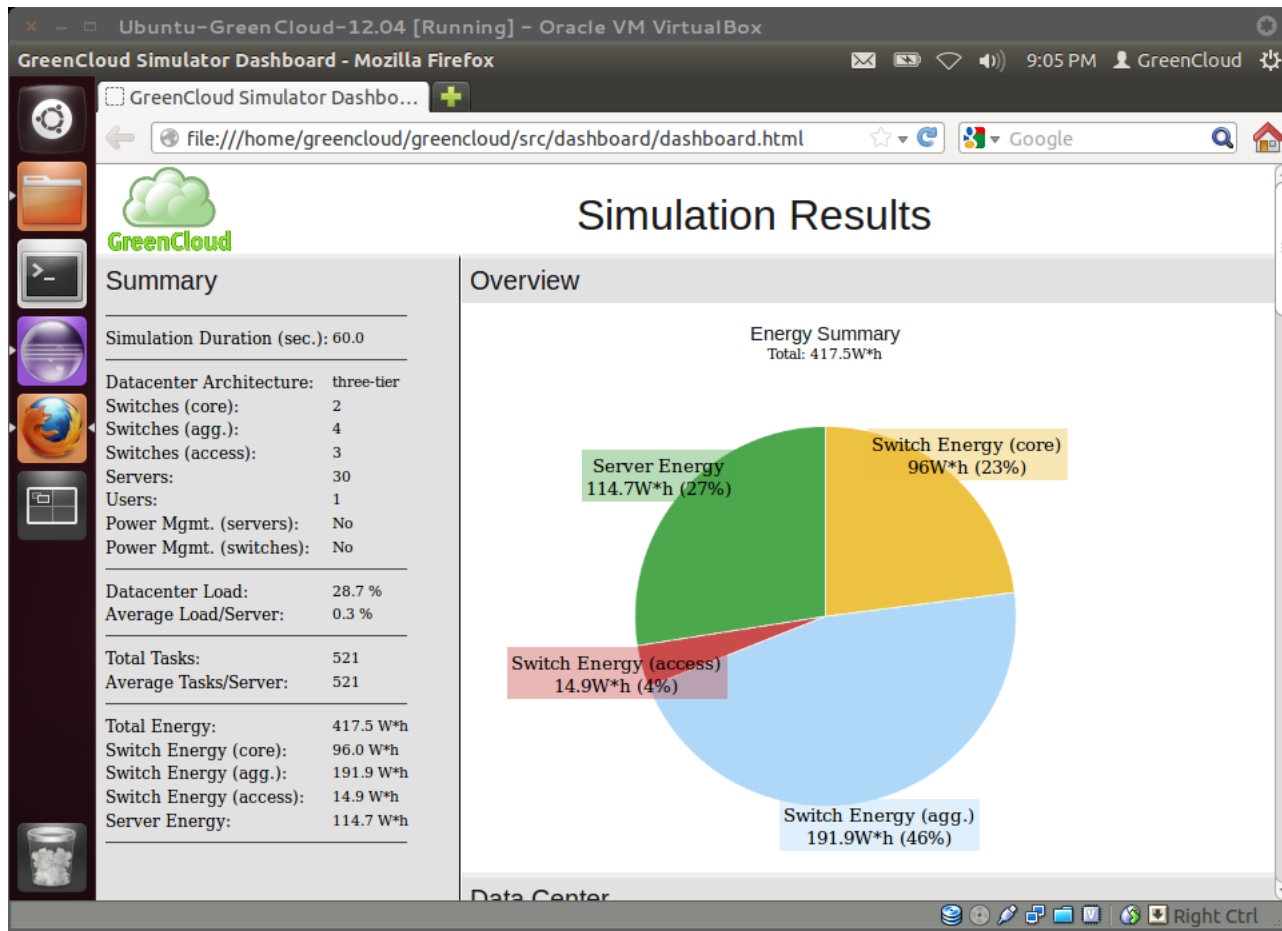


Simulating Energy-Efficient Clouds

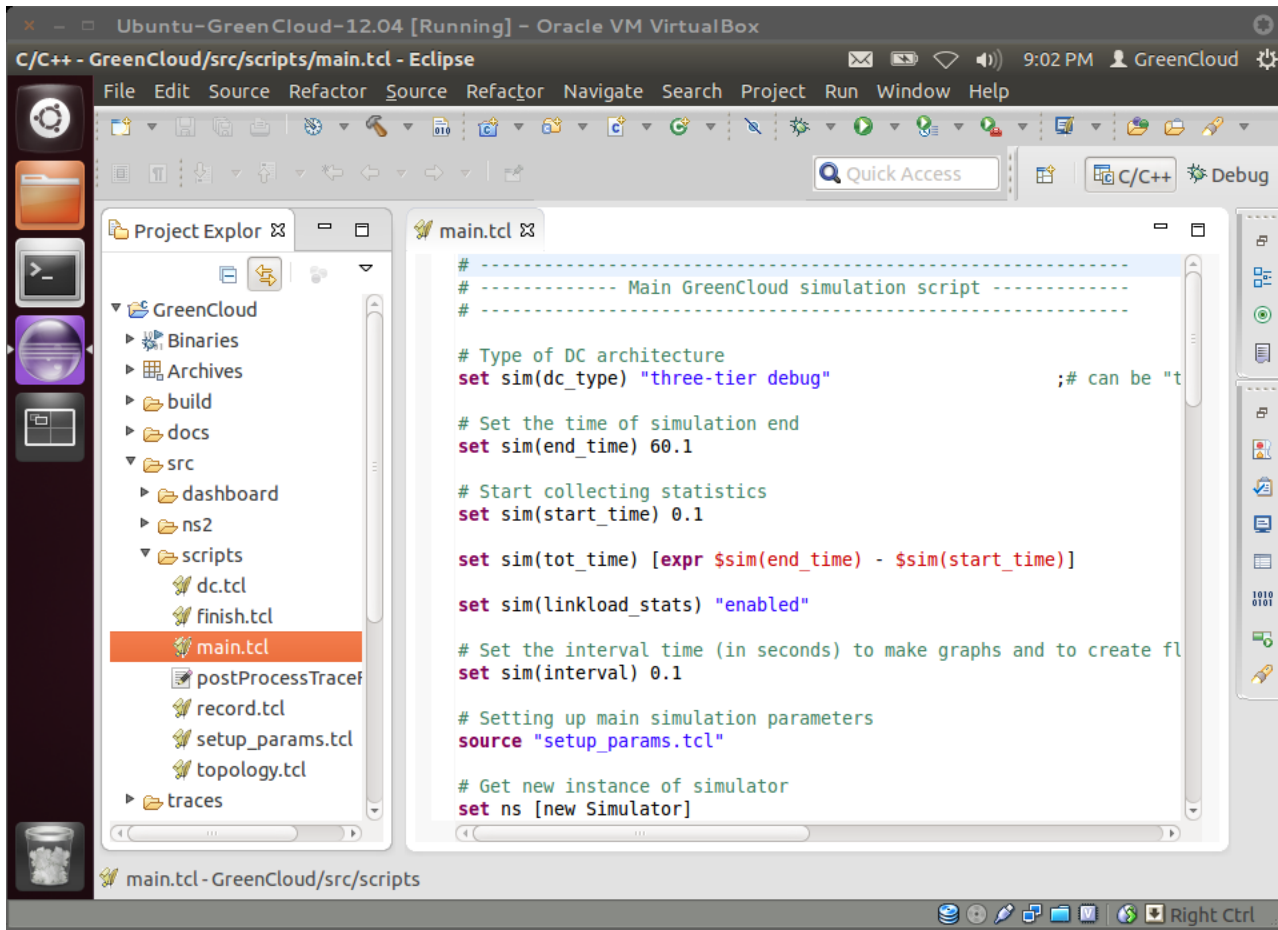
available at
<http://greencloud.gforge.uni.lu>

- Measures cloud performance and energy efficiency
- First to simulate cloud **communications with packet-level precision**
- Implements network-aware scheduling
- Implements complete TCP/IP protocol stack

GreenCloud: Screenshots



GreenCloud: Screenshots



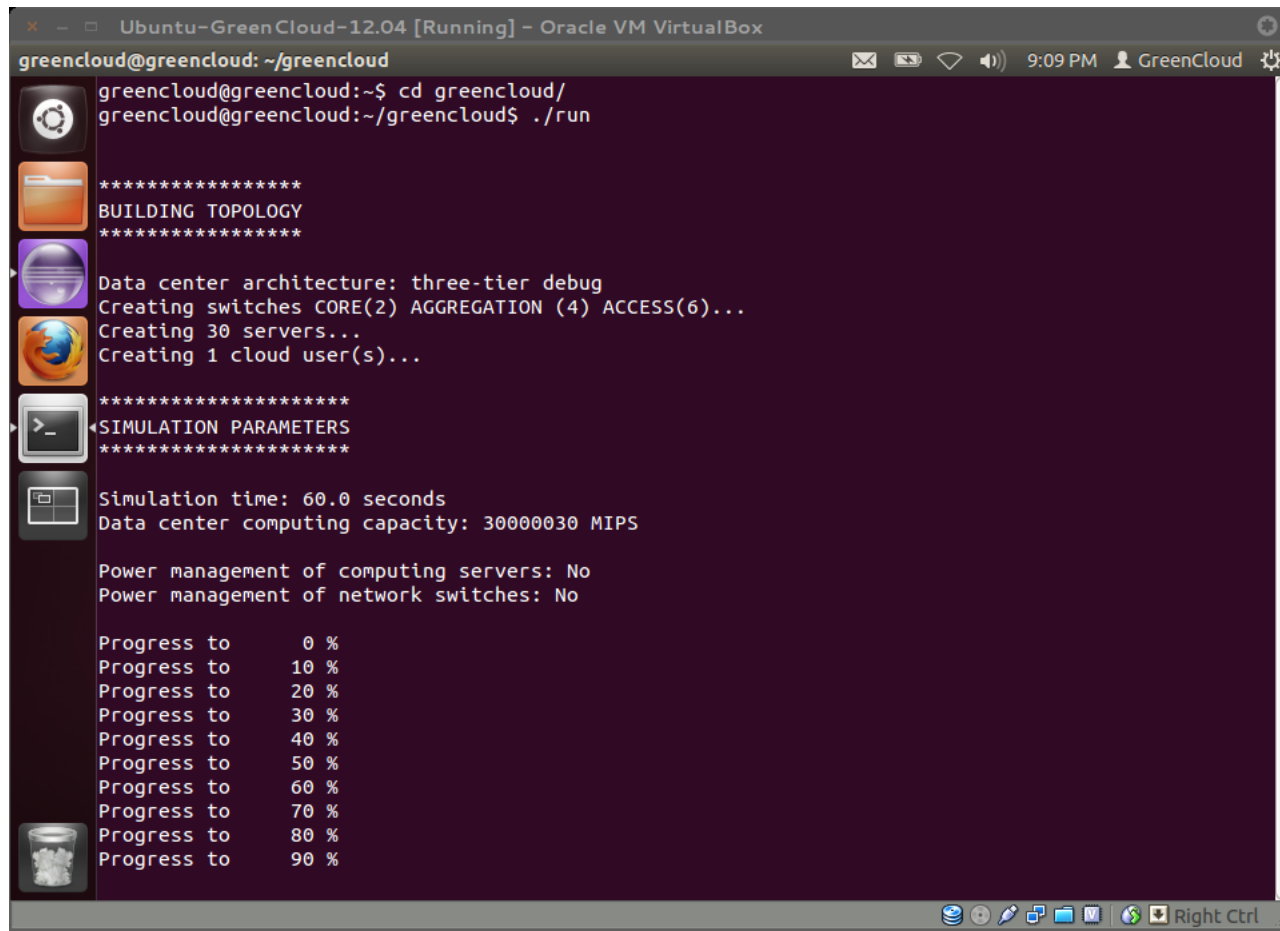
The screenshot displays the Eclipse IDE interface for a project named 'GreenCloud'. The Project Explorer on the left shows the following structure:

- GreenCloud
 - Binaries
 - Archives
 - build
 - docs
 - src
 - dashboard
 - ns2
 - scripts
 - dc.tcl
 - finish.tcl
 - main.tcl
 - postProcessTracef
 - record.tcl
 - setup_params.tcl
 - topology.tcl
 - traces

The main.tcl script is open in the editor, showing the following code:

```
# ----- Main GreenCloud simulation script -----  
  
# Type of DC architecture  
set sim(dc_type) "three-tier debug"           ;# can be "t  
  
# Set the time of simulation end  
set sim(end_time) 60.1  
  
# Start collecting statistics  
set sim(start_time) 0.1  
  
set sim(tot_time) [expr $sim(end_time) - $sim(start_time)]  
  
set sim(linkload_stats) "enabled"  
  
# Set the interval time (in seconds) to make graphs and to create fl  
set sim(interval) 0.1  
  
# Setting up main simulation parameters  
source "setup_params.tcl"  
  
# Get new instance of simulator  
set ns [new Simulator]
```

GreenCloud: Screenshots



```
greencloud@greencloud: ~/greencloud
greencloud@greencloud:~$ cd greencloud/
greencloud@greencloud:~/greencloud$ ./run

*****
BUILDING TOPOLOGY
*****

Data center architecture: three-tier debug
Creating switches CORE(2) AGGREGATION (4) ACCESS(6)...
Creating 30 servers...
Creating 1 cloud user(s)...

*****
SIMULATION PARAMETERS
*****

Simulation time: 60.0 seconds
Data center computing capacity: 30000030 MIPS

Power management of computing servers: No
Power management of network switches: No

Progress to      0 %
Progress to     10 %
Progress to     20 %
Progress to     30 %
Progress to     40 %
Progress to     50 %
Progress to     60 %
Progress to     70 %
Progress to     80 %
Progress to     90 %
```

#3



Third IEEE International Conference on Cloud Networking

Luxembourg • October 8-10, 2014



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IEEE CloudNet'14 Topics:

- Data Center Network Management, Reliability, Optimization
- Distributed Data Center Architectures
- Internet Routing of Cloud data
- Green Data Centers and Cloud Networking
- Mobile Cloud Networking
- [More topics >>](#)

Important Dates

Paper Submission: **May 1, 2014**

Notification: **August 1, 2014**

Final Paper: **August 25, 2014**

Thank you!

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