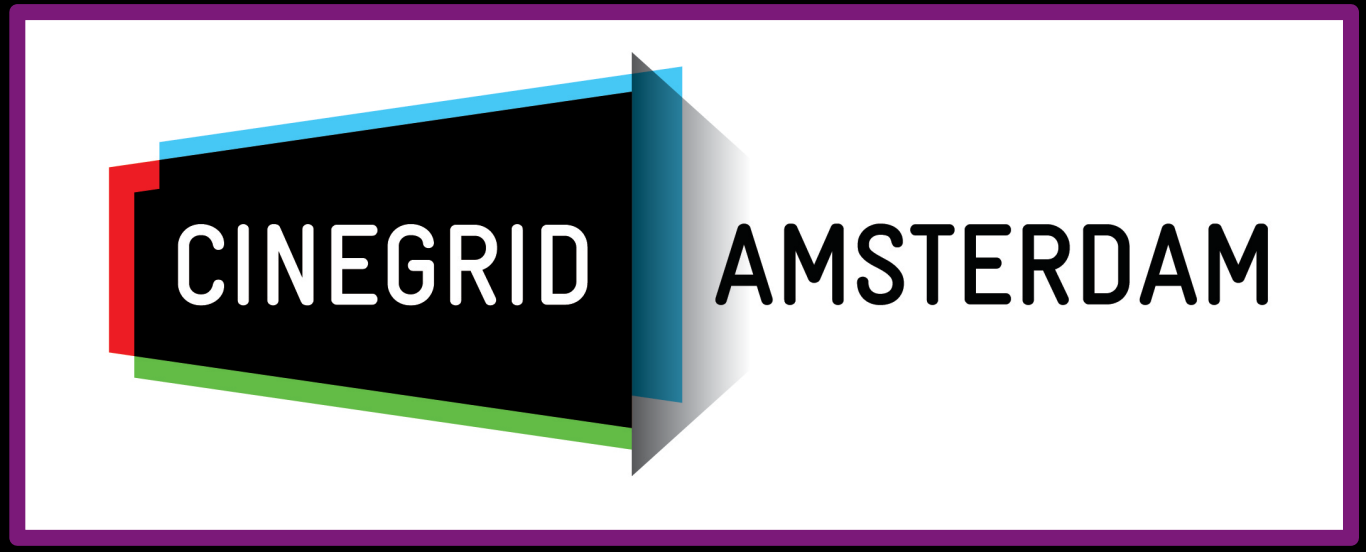


Cees de Laat

Processing Media in Public/Private Clouds

Many slides from partners & CineGrid.org

CINEGRID AMSTERDAM GOALS

Assemble technology, science, art and education to create new concepts, pilots & business models that result in:

- New forms of storytelling
- New domains for scientific exploration
- Transformation of workflows in creative media production
- Better education
- Enhanced economic growth

PARTNERS

CONSORTIUM PARTNERS

SURFnet, UvA, SARA, Dutch Film- and Television Academy, DELL, TNO, Holland Festival, Blender Institute, Sandberg Institute, MediaGuild, Waag Society

COLLABORATORS

Poznan Supercomputing Center, Amsterdam Innovatie Motor, UCSD, University of Illinois, NHK, KTH, KEIO University, Pathé Benelux, Filmmuseum, Salto, Nationale Computer Faciliteiten, IDFA, BeamSystems, ISOC, IDFA, DutchView, PICNIC, GridForum and many more

© Arne de Laat
153957 Photography
http://arne.delaat.net

CINEGRID AMSTERDAM

Research-, development- and outreach facility for production, transport and projection of digital cinema:

- Digital projection and sound in very high quality
- Editing and capture facilities
- Rendering & disk space
- Extremely high quality networks

In the center of Amsterdam

International context

- Focus on spin-offs & lasting value

RESOURCES

CineGrid Studio for 4K postproduction

- 100 TB of Highly Connected Storage Space - Ams-CGX
- High Performance Render Cluster
- 3 * 4K Screens and
- 1 – 100 Gb/s light path connections

Expertise in

- Production
- Encoding
- Transmission
- Screening

“Learning by Doing”
Early CineGrid Projects in Amsterdam

Red End 2009

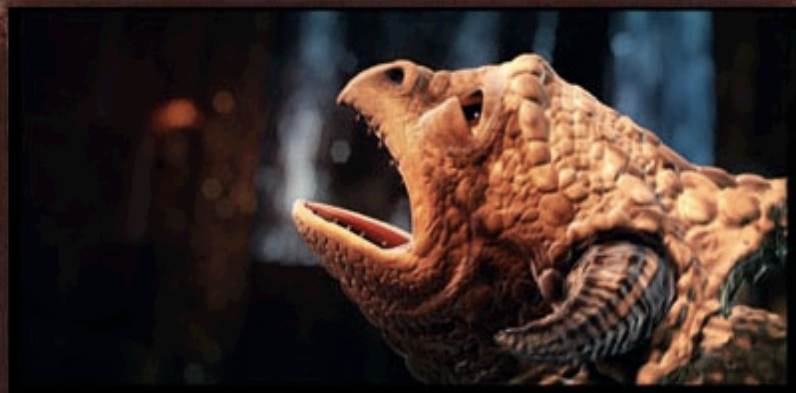
7 Bridges @ Amsterdam 2007

CineGrid @ Holland Festival 2007

First 4k Camera on canal 2007

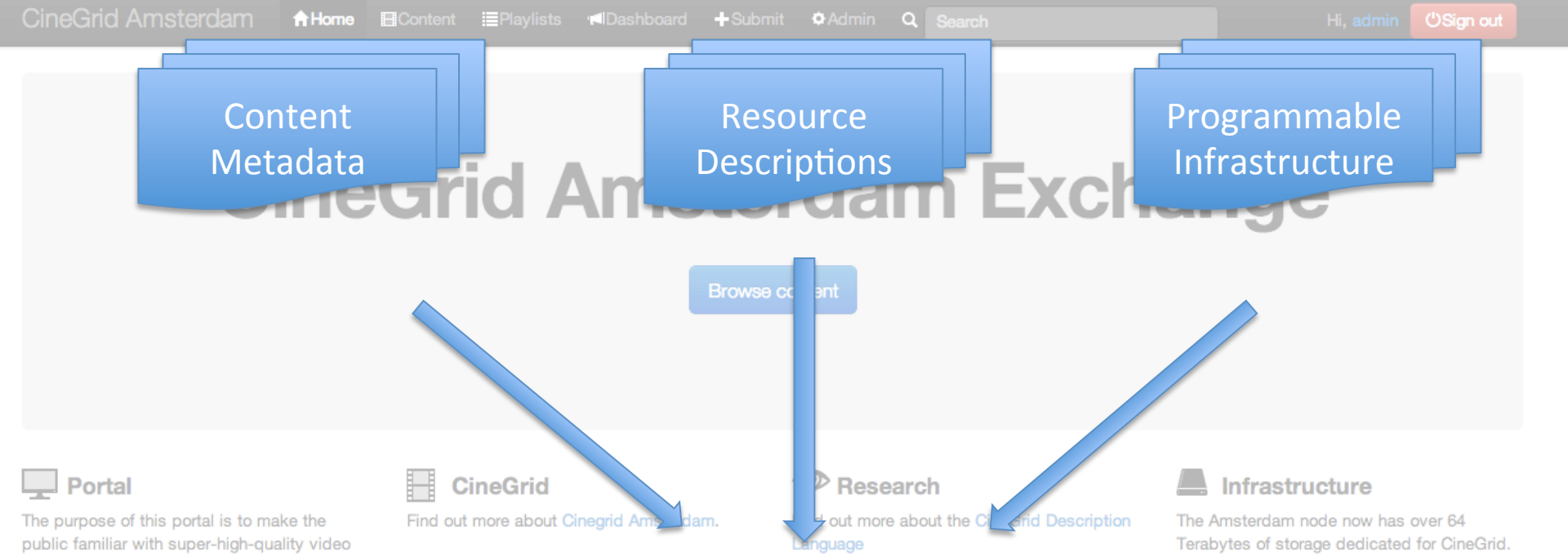
Handelingen
Maarten de Heer

SO FAR
CineGrid 2011 & 2012
One minutes
Mediapark Jaarcongres ’08 ’09 ’10
Holland Animation Film Festival
Holland Festival ’07 & ’10
Content, content content..
Educational contest
4K How to Cookbook
PICNIC’08 & ’09
SURFnet GigaPort
Workshops 4K
ICT Delta ’09
BeamLab
2009 ANIMATION FILM FESTIVAL
HOLLAND UTRECHT



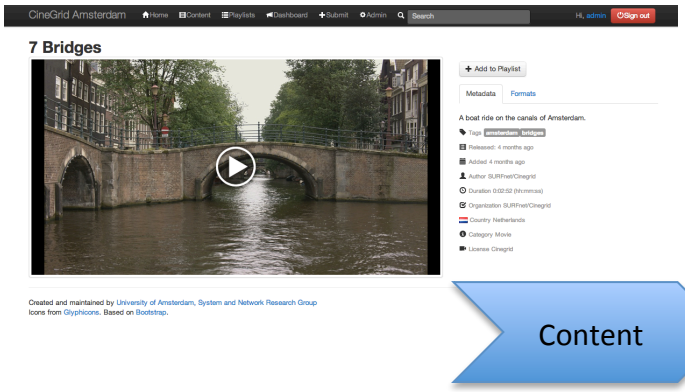
Hey, sit still.

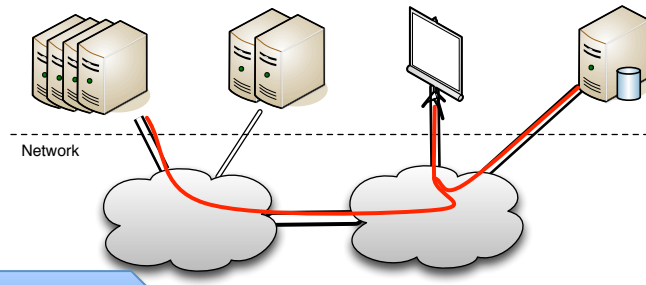
We're almost done. Shhh...



CineGrid Portal

Unified orchestration of distributed CineGrid resources

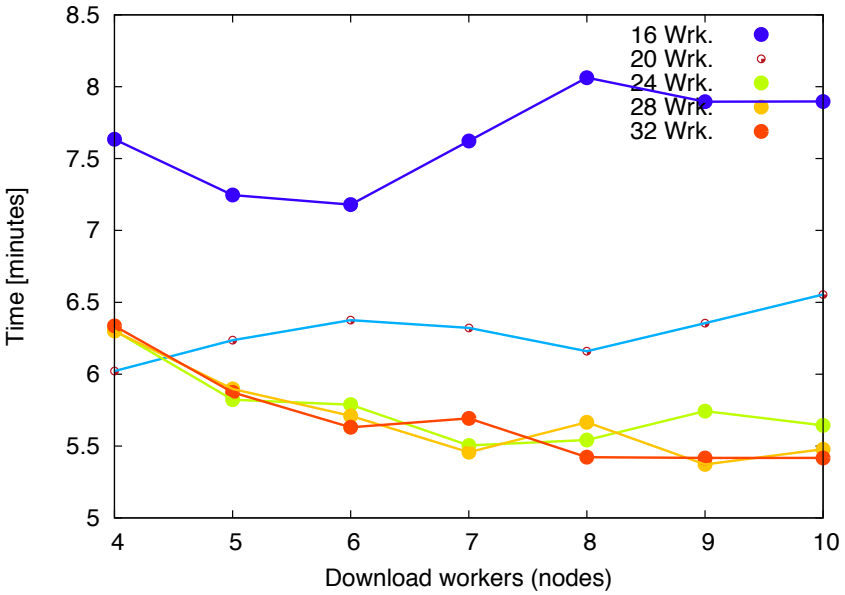


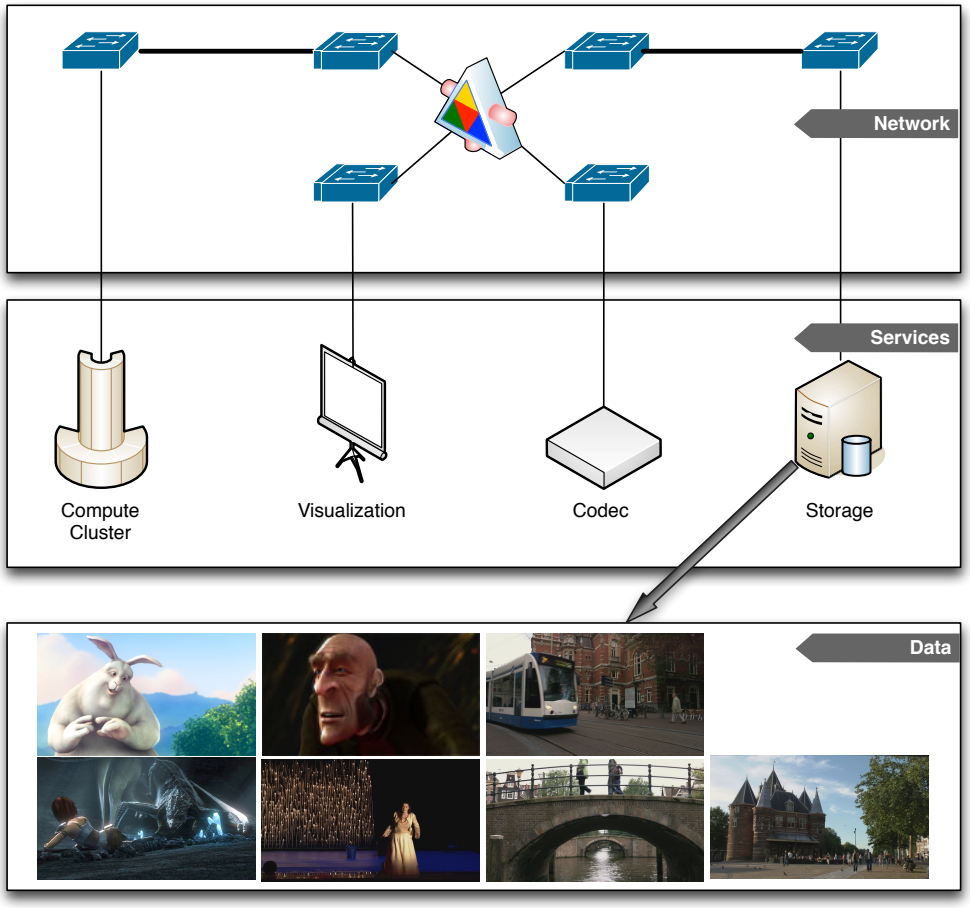


Content → Workflow → Resources → Execution

HyperFlow

Encoding times improve as the end nodes are connected via dynamic lightpaths





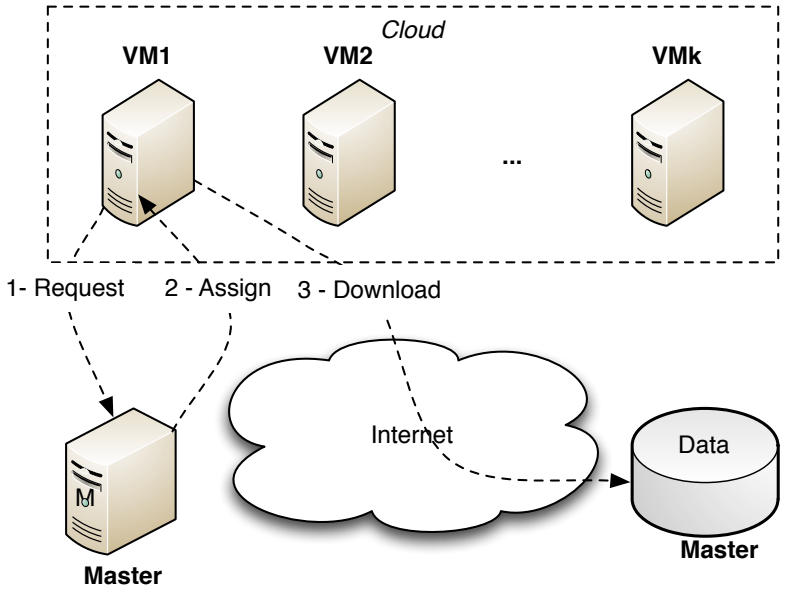
C. Dumitru, Z. Zhao, P. Grosso and C. de Laat
HybridFlow: Towards Intelligent Video Delivery and Processing Over Hybrid Infrastructures
(In CTS 2013))

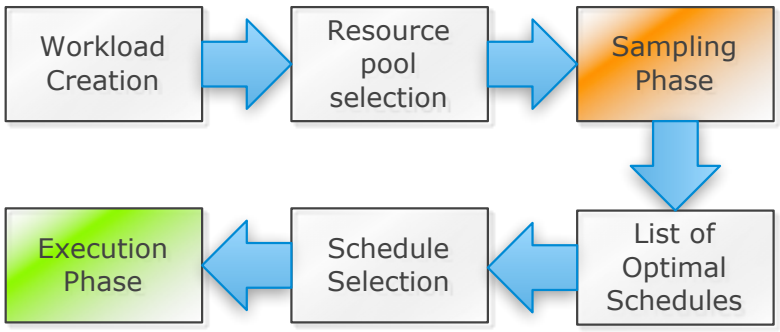
Processing CineGrid with Clouds
A queuing model approach

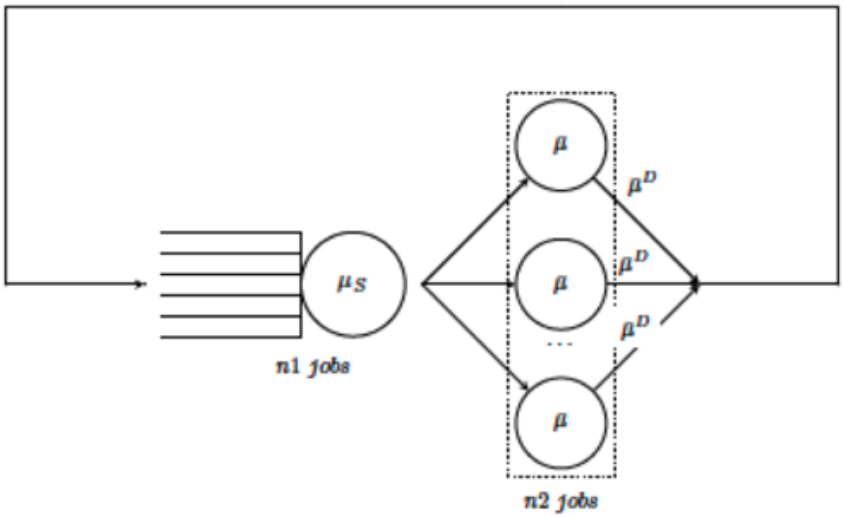
Process large amount of independent data
- Bags-of-Tasks + Data = Bags-of-Data
- Example : Image processing
- Independent files
- Large sizes (10-100s of MBs)

Idea: rent resources
- scaling up (more resources)
- scaling out (more powerful resources)
- Which option ?
- How many ?

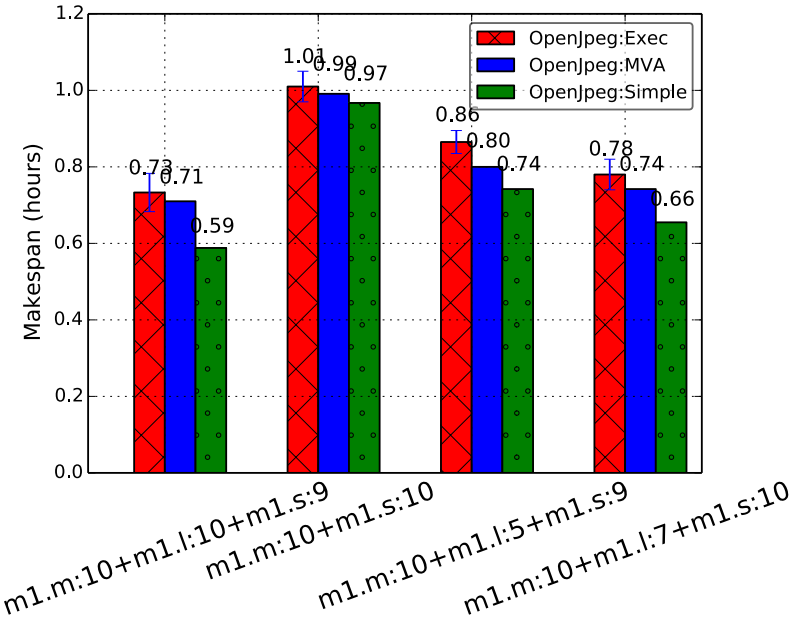
Requirements:
- Within time
- Within budget
- Simple, if possible

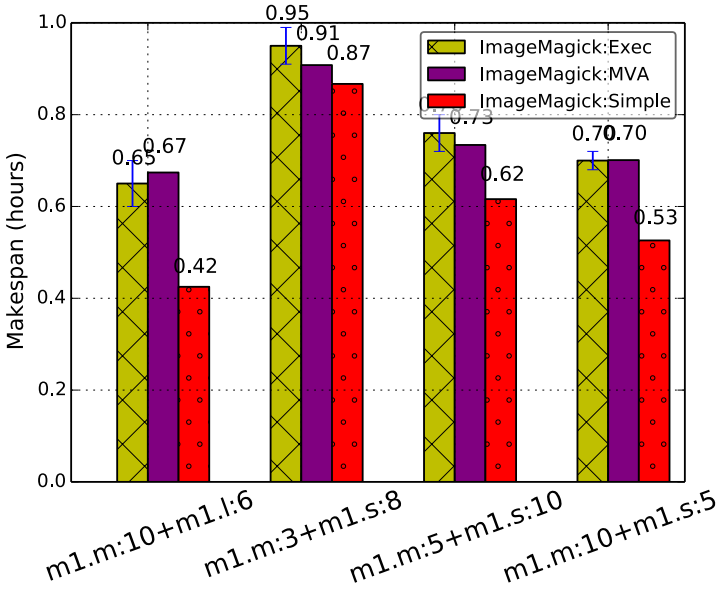


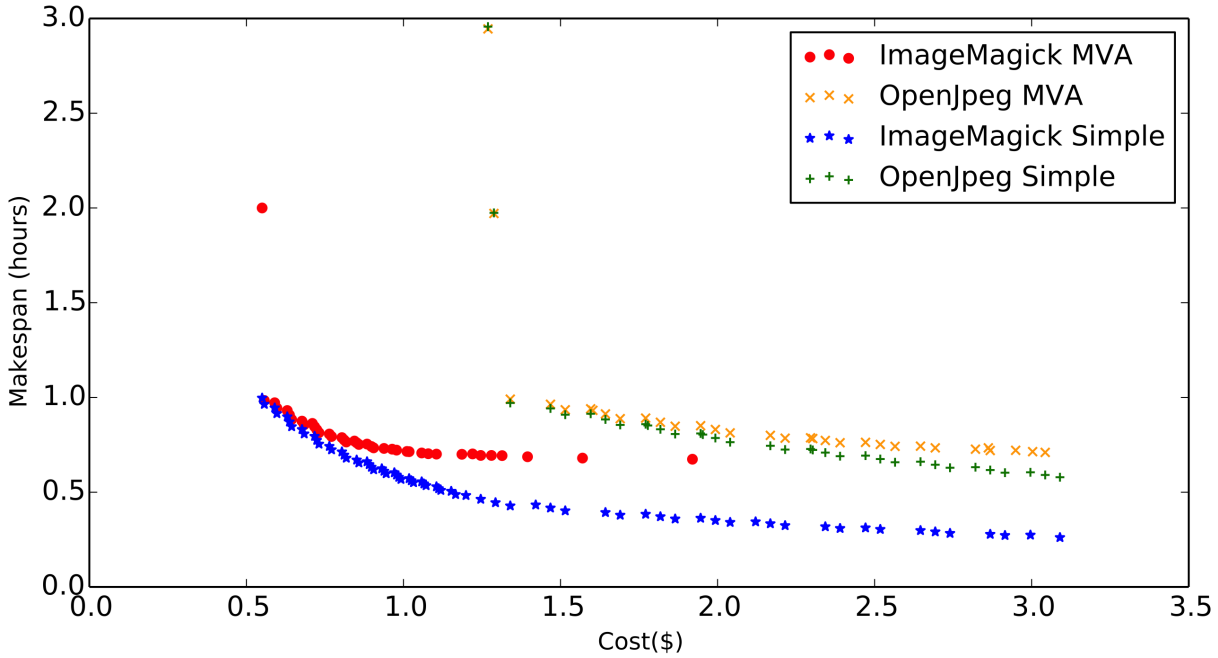




Processing in the Cloud: Mean Value Analysis, Pareto fronts

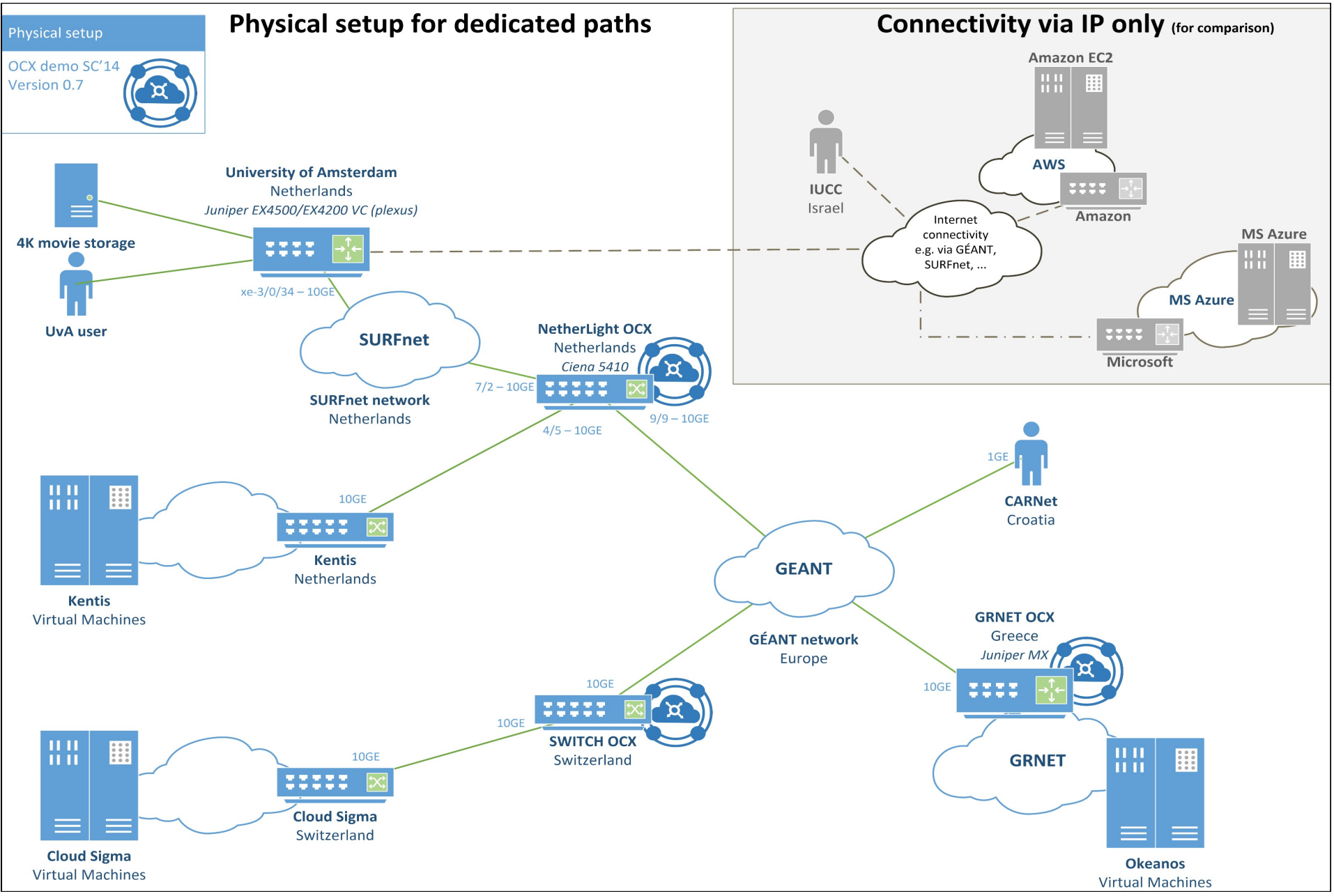






Cosmin Dumitru, Ana-Maria Oprescu, Miroslav Zivkovic, Rob van der Mei, Paola Grosso, Cees de Laat, "A Queueing Theory Approach to Pareto Optimal Bags-of-Tasks Scheduling on Clouds", August 27 2014 , Euro-Par 2014, Porto, Portugal

Demo @ SC14


Physical setup
OCX demo SC'14
Version 0.7
Physical setup for dedicated paths
Connectivity via IP only (for comparison)
Amazon EC2
AWS
Amazon
IUCC
Israel
Internet connectivity e.g. via GÉANT, SURFnet, ...
MS Azure
MS Azure
Microsoft
University of Amsterdam
Netherlands
Juniper EX4500/EX4200 VC (plexus)
4K movie storage
UvA user
xe-3/0/34 – 10GE
SURFnet
SURFnet network
Netherlands
NetherLight OCX
Netherlands
Ciena 5410
7/2 – 10GE
9/9 – 10GE
4/5 – 10GE
1GE
CARNet
Croatia
10GE
Kentis
Netherlands
Kentis
Virtual Machines
GEANT
GÉANT network
Europe
GRNET OCX
Greece
Juniper MX
10GE
10GE
10GE
SWITCH OCX
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GRNET
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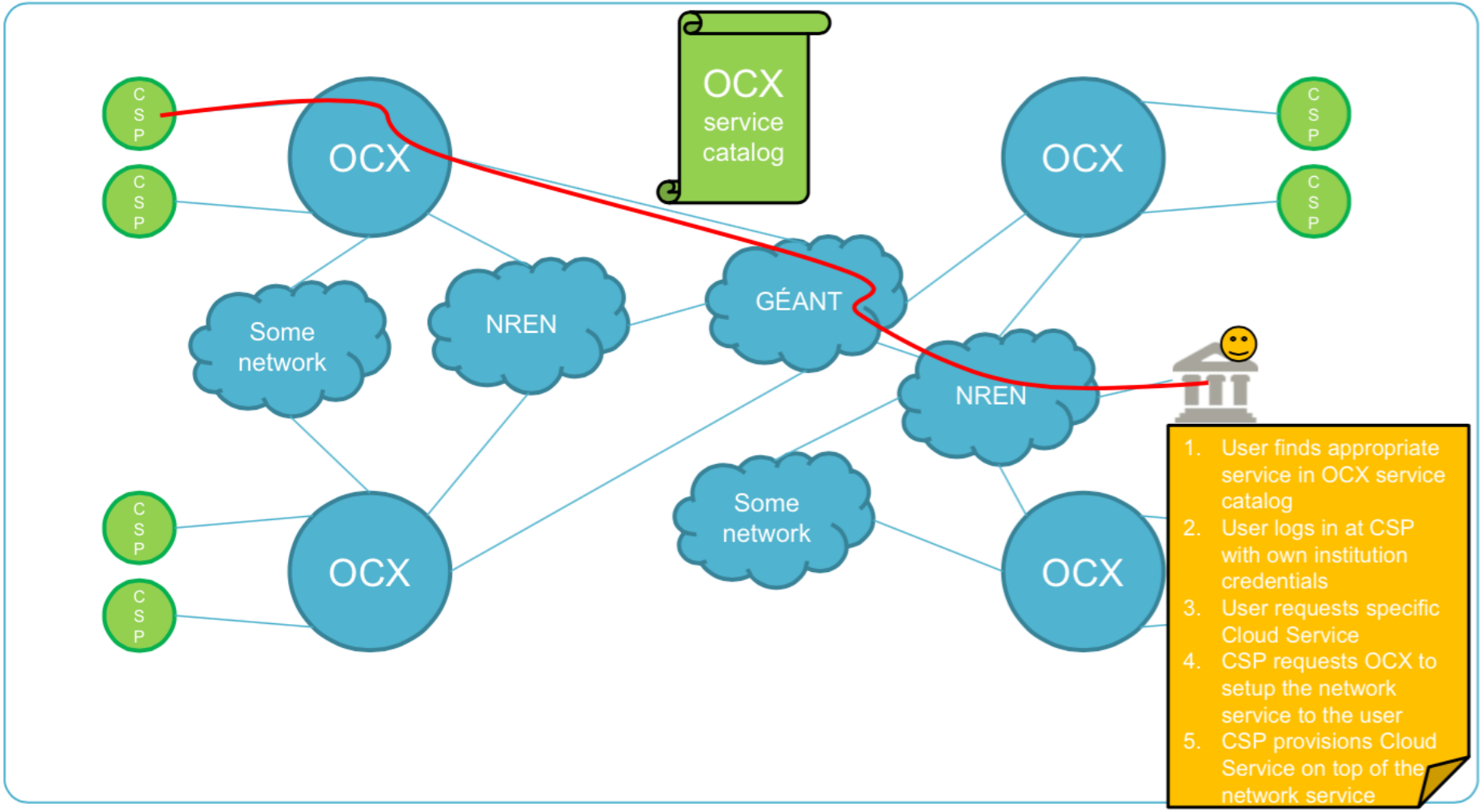
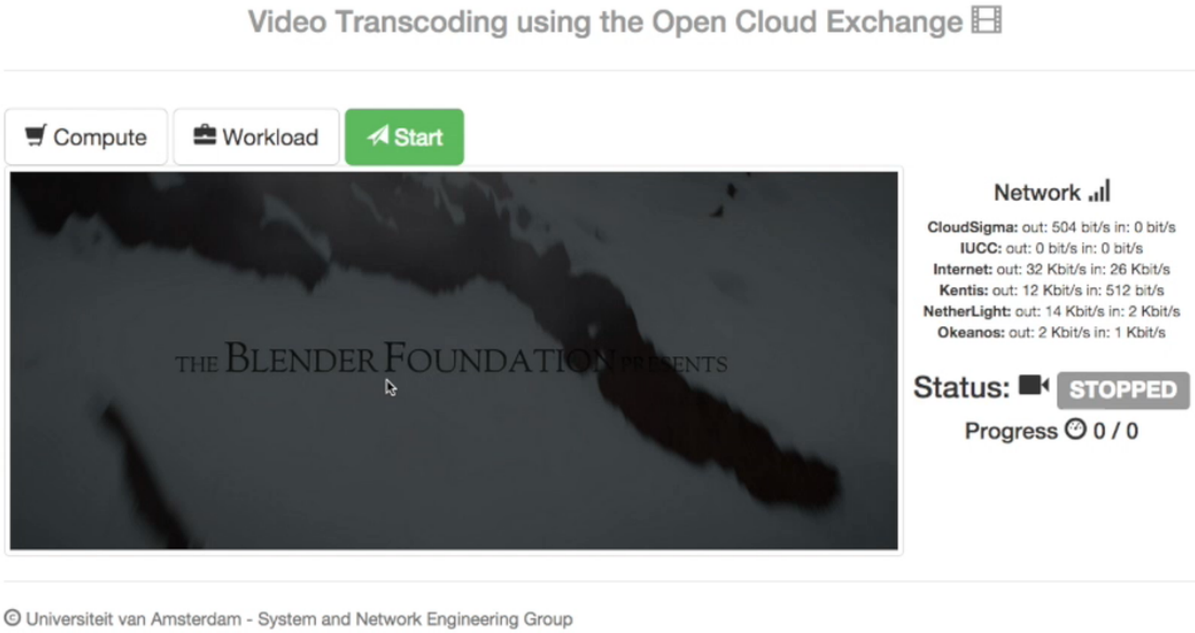
Cloud Sigma
Switzerland
Cloud Sigma
Virtual Machines
Okeanos
Virtual Machines

Open Cloud eXange

OCX



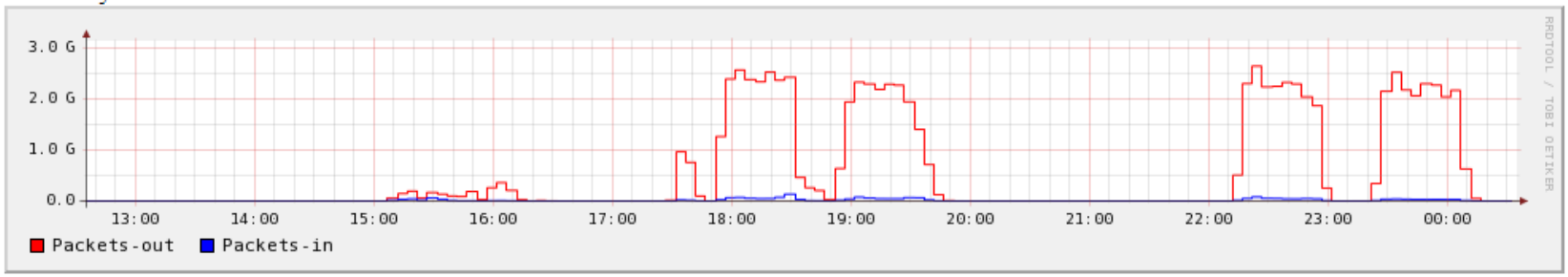


OCX @ SC14

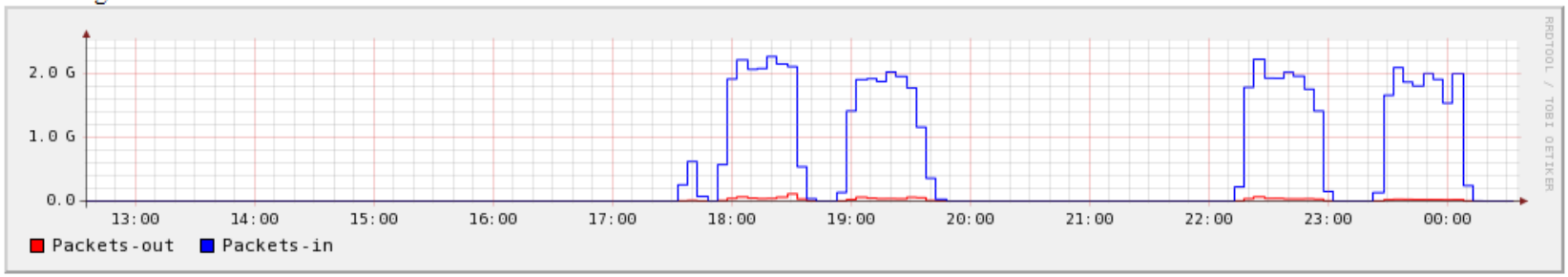
Also: http://sc.delaat.net/sc14/demo-ocx.html

SC14

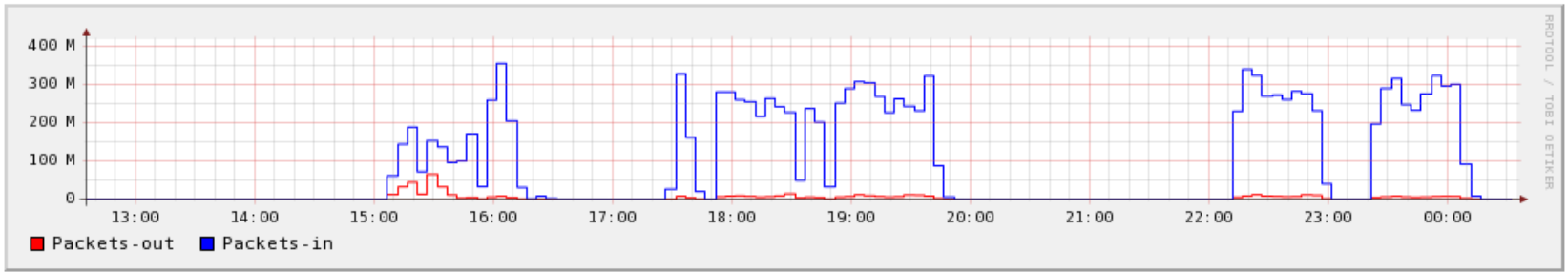
University of Amsterdam



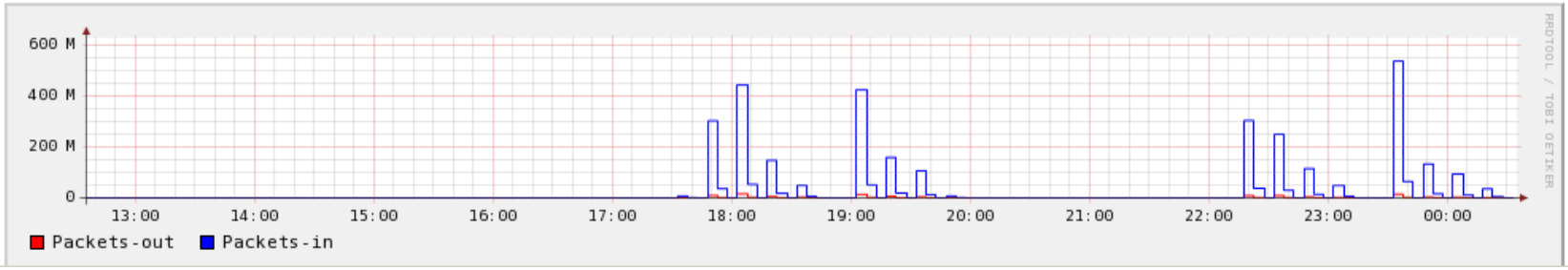
Cloud Sigma



Kentis



Okeanos



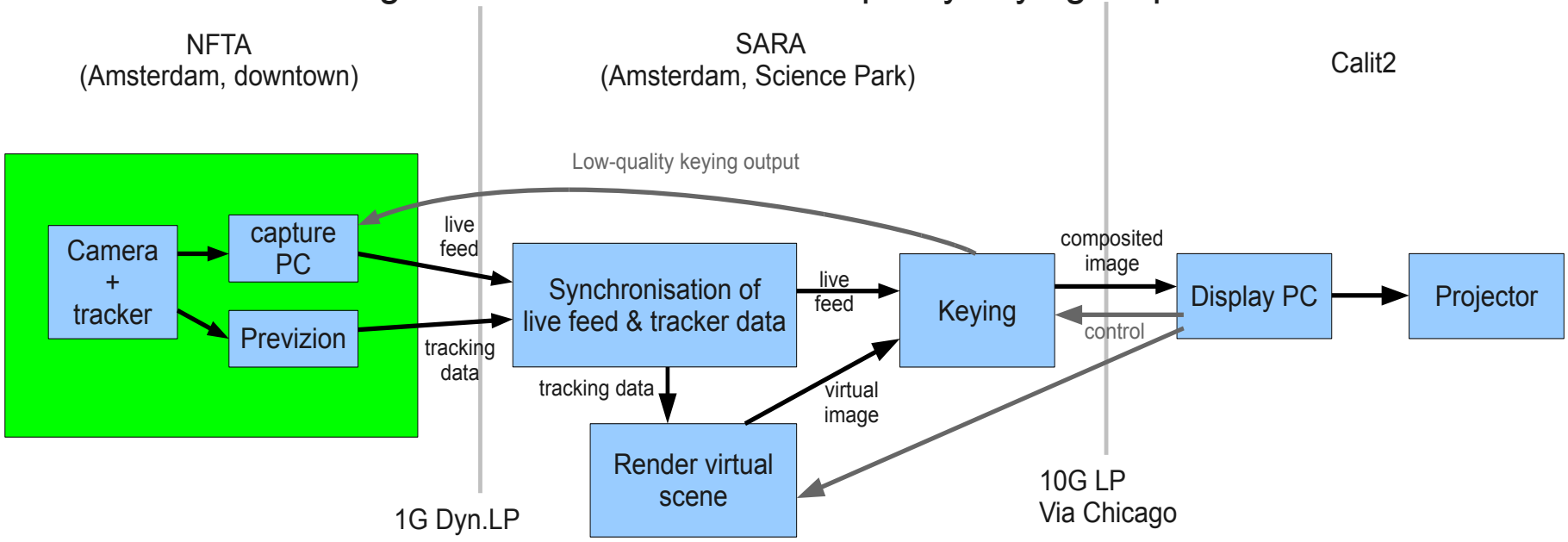
Directing Remote Live Shoot of Virtual Set Acting with Live Compositing in the Cloud

Live action camera, actors, green screen at NFTA (Amsterdam #1)
Virtual set compositing at SARA (Amsterdam #2)
Remote viewing and direction at UCSD/Calit2 Vroom (San Diego)

Real Time Rendering Workflow

Demo setup

- Three locations
  1) NFTA: greenscreen studio, Previzion, camera(+man), actress (+ dress)
  2) SARA: render node for keying, virtual scene rendering
  3) Calit2: keying controls, projection of final output, director
- Two lightpaths in between
- Video-conferencing for communication + low quality keying output back to NFTA



Movie Making on the GLIF

One Minutes: Enchanting Detail Contest

de betoverende detail wedstrijd

oproep voor one minutes in 4K

One Minutes: stunning quality

Direction

- Distributed Comp -> Grid -> Cloud -> Big Data
- Lego Block approach
- Application as a Service
- Elastic Cloud
- Determinism & Real Time?
- CineGrid ToolBox
- Storage
- Deep Storage
- Very Deep Storage

Scientific Publications: FGCS Special Issue on CineGrid!

Volume 27, Issue 7,june 2011

Guest Editors: Naohisa Ohta & Paul Hearty & Cees de Laat

Editorial: CineGrid: Super high definition media over optical networks.

1. Real-time long-distance transfer of uncompressed 4K video for remote collaboration.
2. Media Network (HPDMnet): An advanced international research initiative and global experimental testbed.
3. Producing and streaming high resolution digital movies of microscopic subjects.
4. Enabling multi-user interaction in large high-resolution distributed environments.
5. Tri-continental premiere of 4K feature movie via network streaming at FILE 2009.
6. A collaborative computing model for audio post-production.
7. Design and implementation of live image file feeding to dome theaters.
8. Beyond 4K: 8K 60p live video streaming to multiple sites.
9. Using ontologies for resource description in the CineGrid Exchange.
10. CineGrid Exchange: A workflow-based peta-scale distributed storage platform on a high-speed network.
11. CSTP: A parallel data transfer protocol using cross-stream coding.
12. Multi-point 4K/2K layered video streaming for remote collaboration.

CineGrid-Amsterdam was supported by

City of Amsterdam, Pieken in de Delta

EFRO / Kansen voor West, Province of Noord-Holland

Agentschap NL
Ministerie van Economische Zaken

Gemeente Amsterdam

Provincie Noord-Holland

www.cinegrid.nl