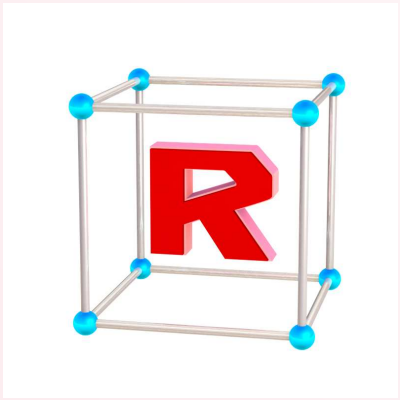

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An Elastic Animation Render Farm on Cloud Computing Using Open Source Software

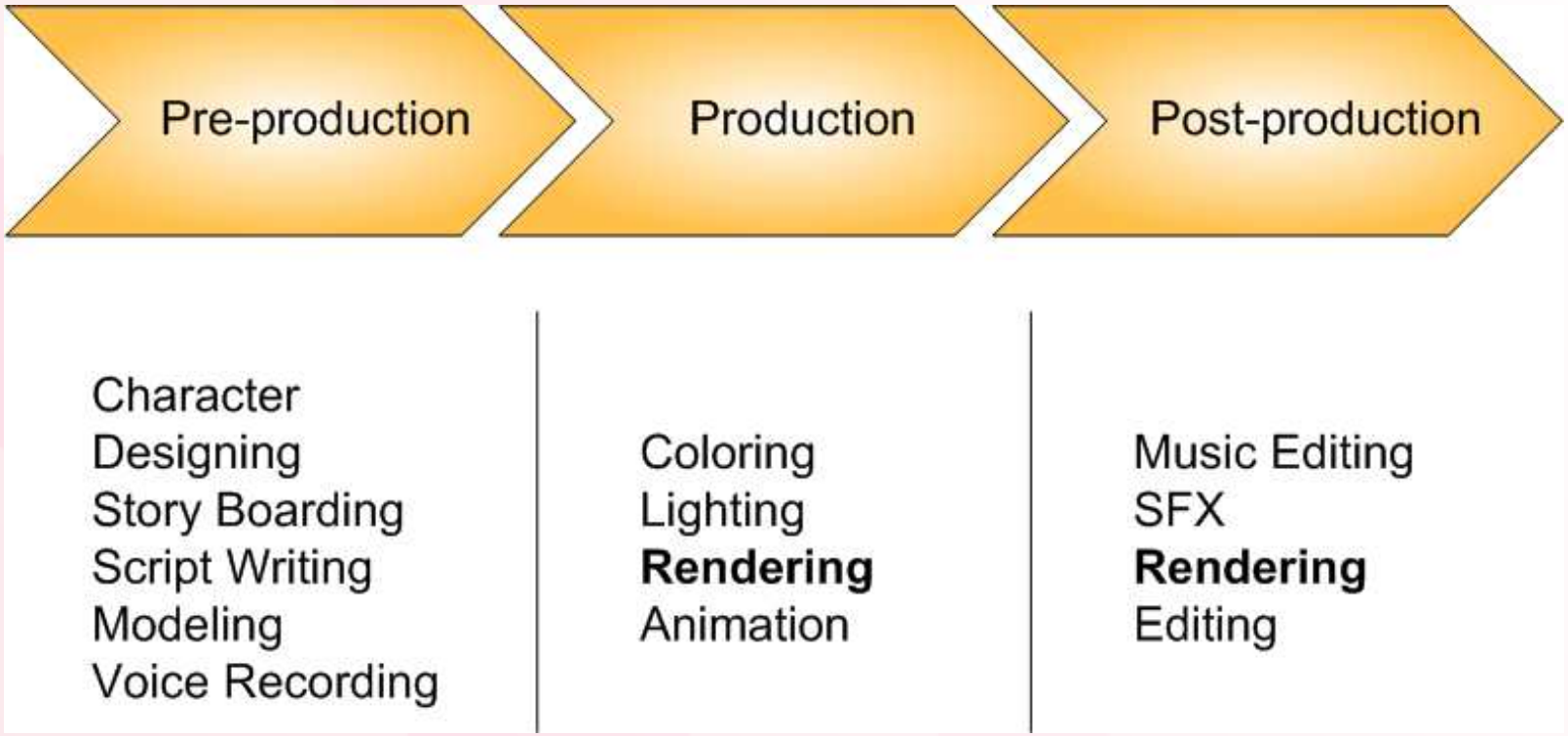
Ekasit Kijsipongse, Suriya U-ruekolan,
Sornthep Vannarat

Large scale Simulation Research Laboratory
National Electronics and Computer Technology Center

Outline

- Motivation
- Cloud computing technology
- The design and architecture of elastic render farm
- Prototype
- Experiments
- Conclusions & future work

Animation Production Process

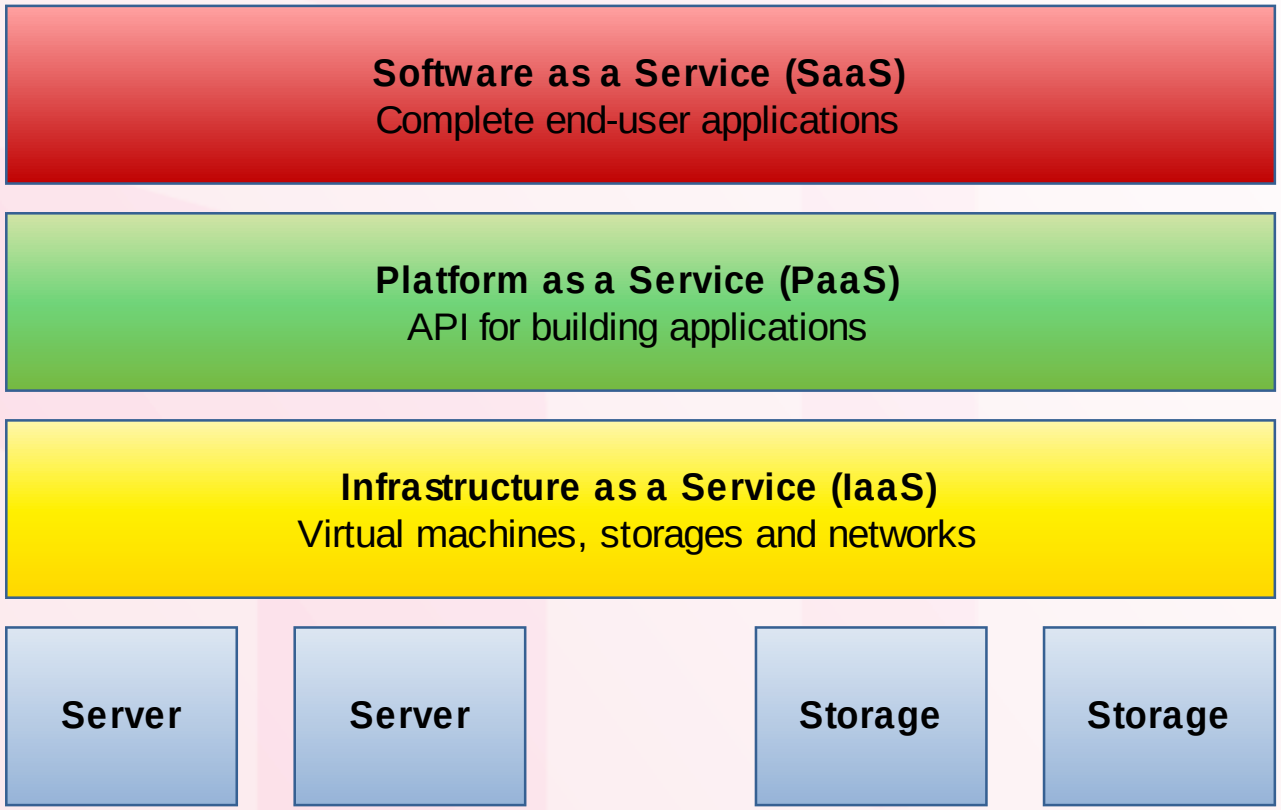


» Render farm is necessary in rendering

Motivation

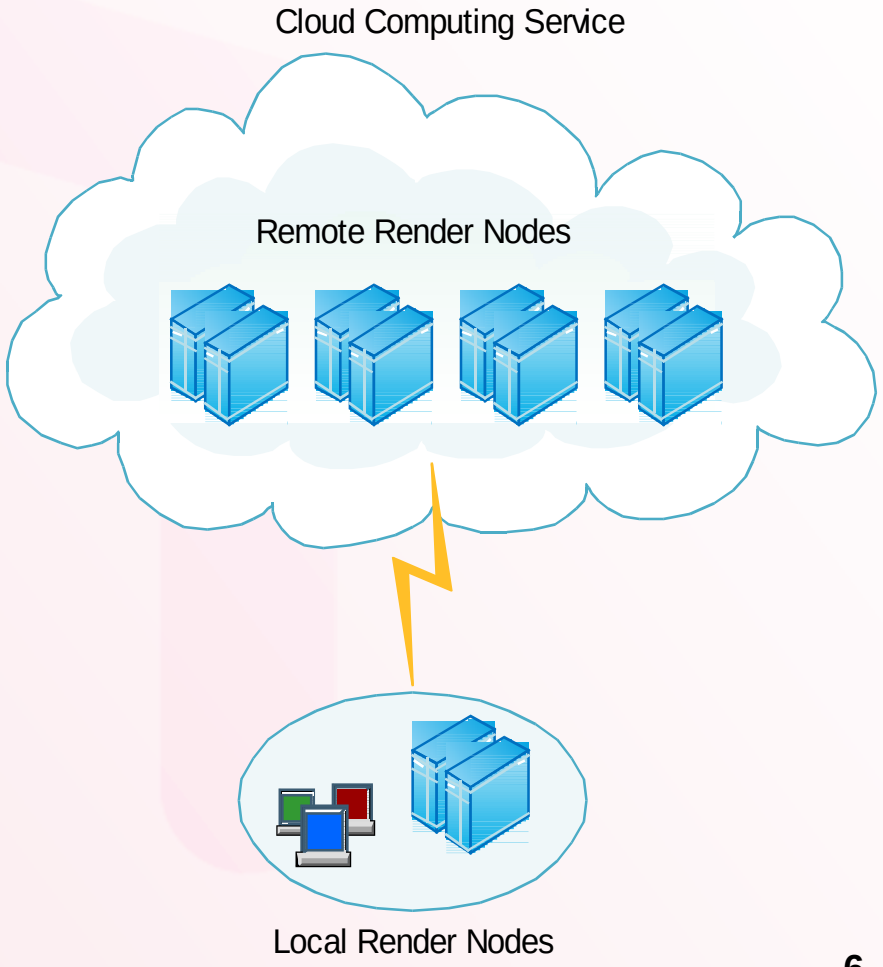
- The demand of render farm is growing
  - More than 10 universities offer animation courses
  - Thai animation industry is supported by SIPA
- Problem statement
  - Over hardware investment (low utilization)
  - High operation and maintenance cost
- Solution
  - *Computing on demand*

Cloud Computing



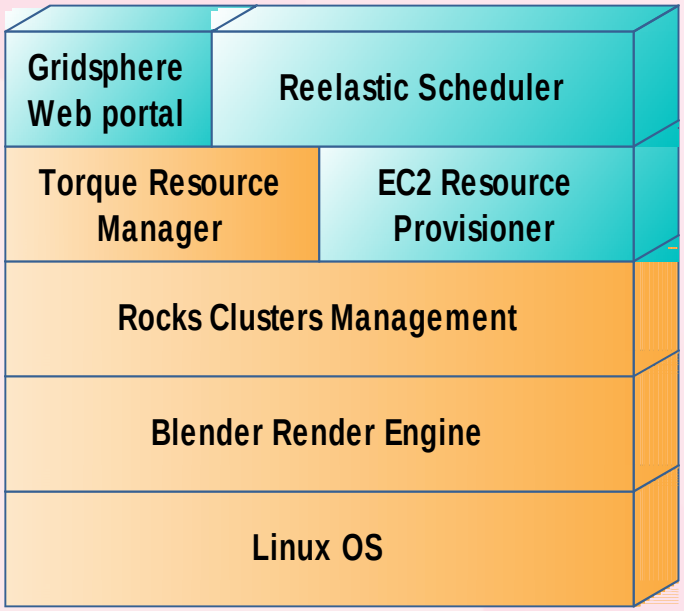
Elastic Render Farm

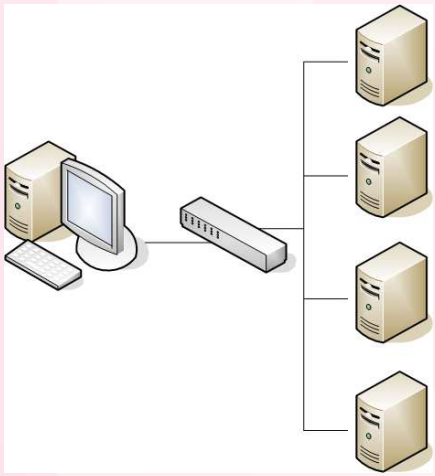
- User friendly
- Anywhere, anytime
- Security
- Open source, open standard

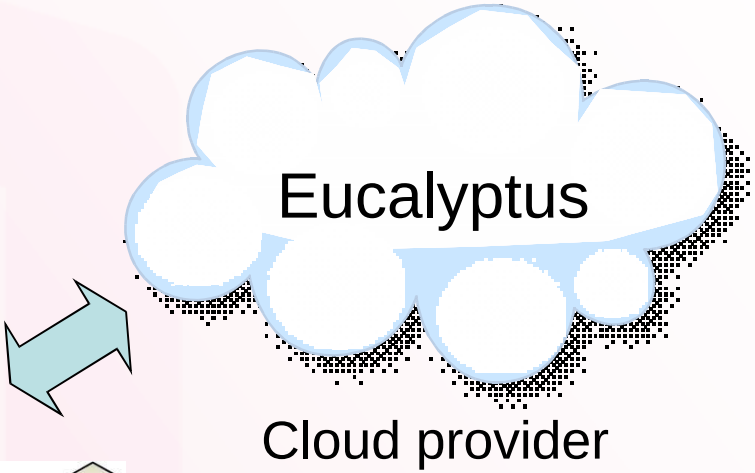


Open Source Software

Local render farm







Cloud provider

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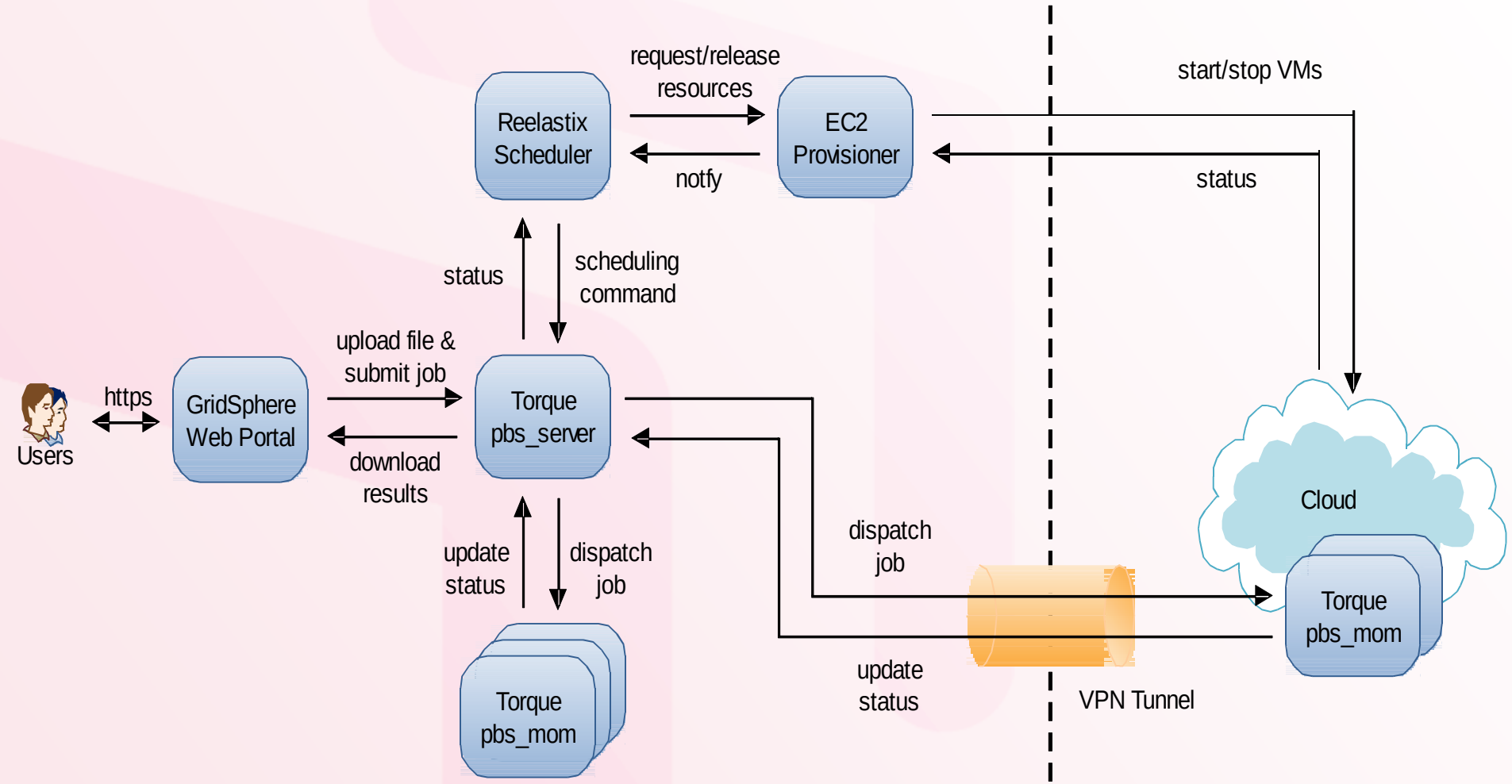
Design & Architecture



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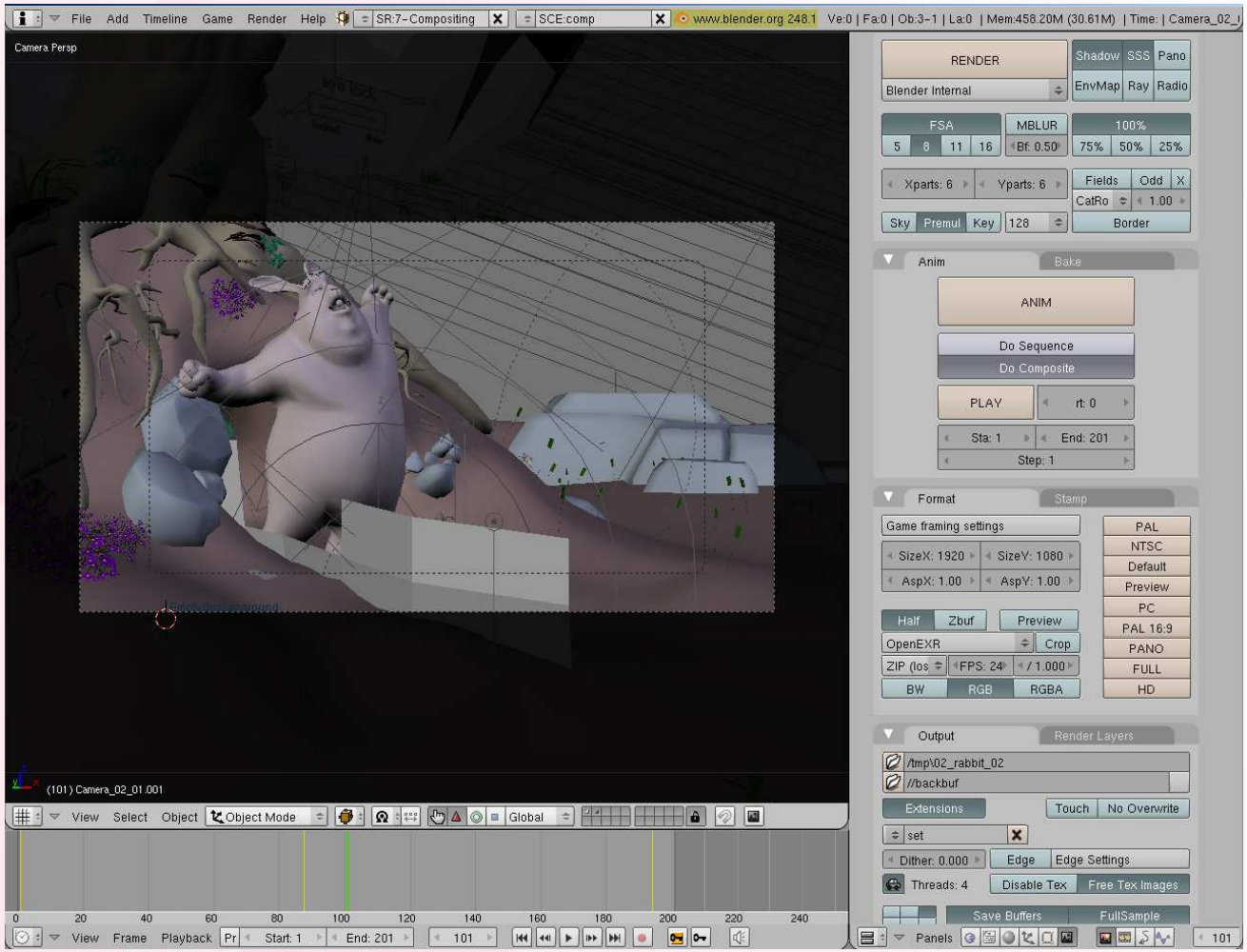
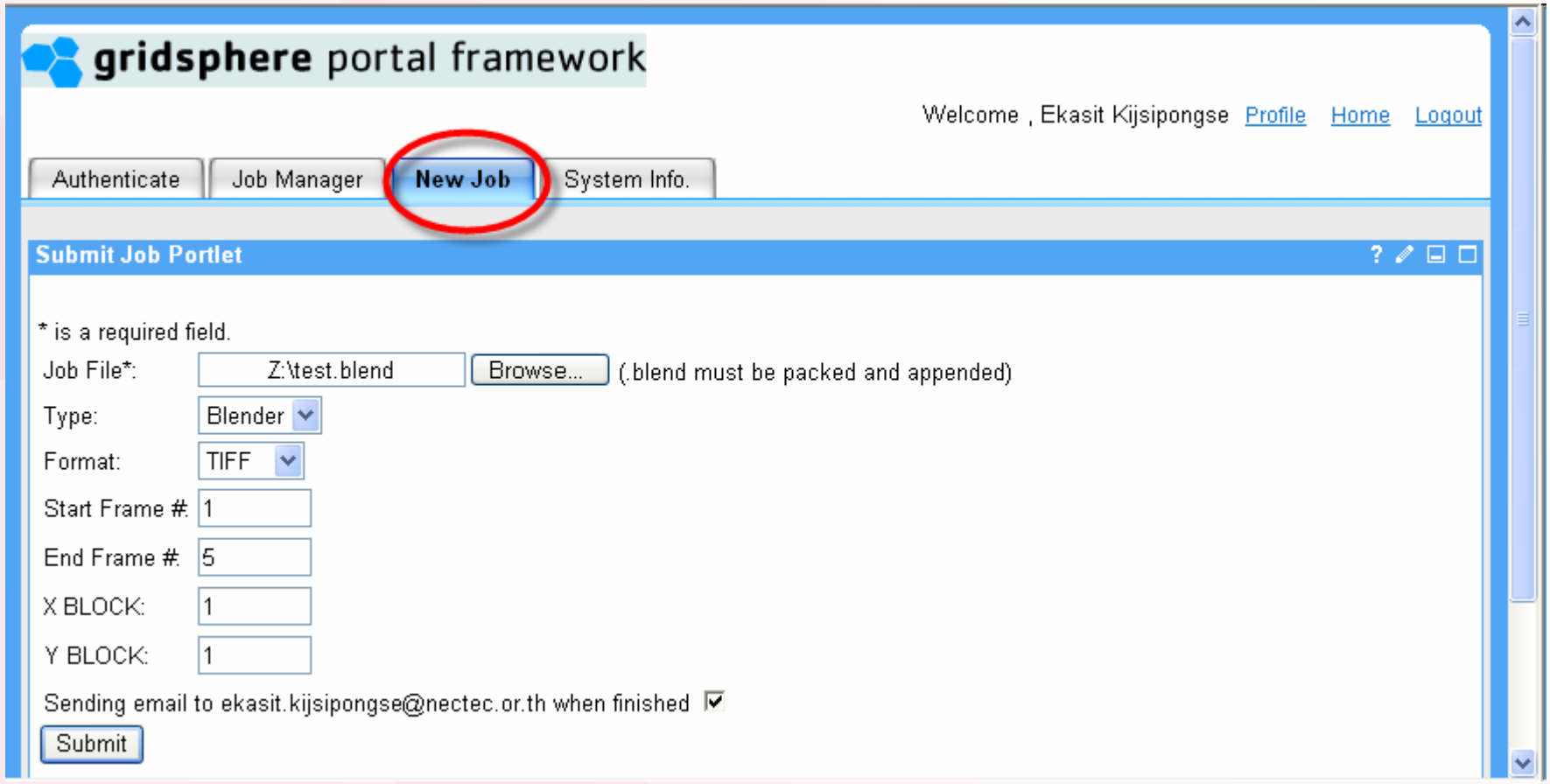
Prototype

- Features
  - Job submission & management
  - Job monitoring and error report
  - Retrieving render output
  - Expand to Cloud resources when the average queue time > Threshold

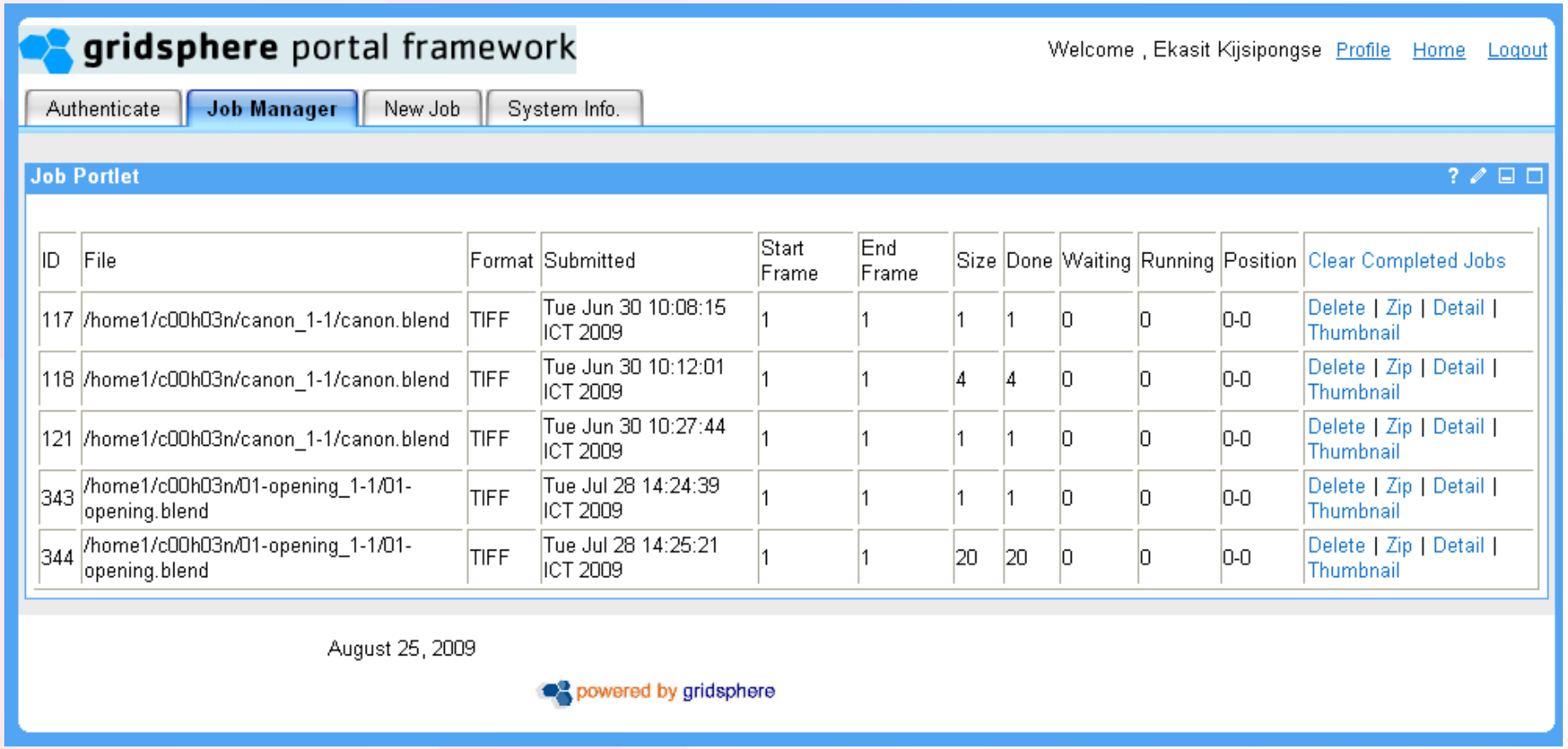
Blender 3D Modeling Software



Job Submission

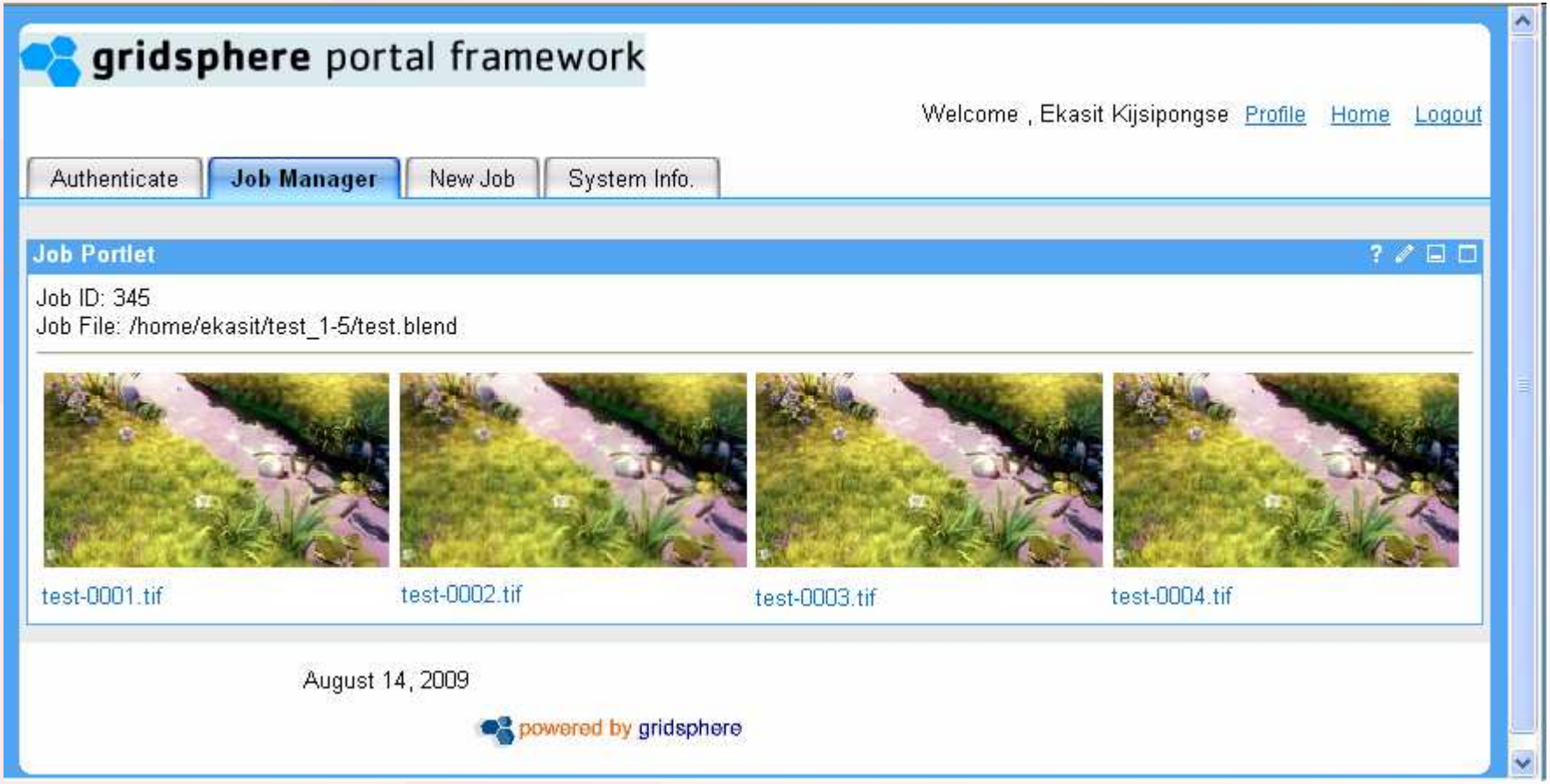


Job Manager

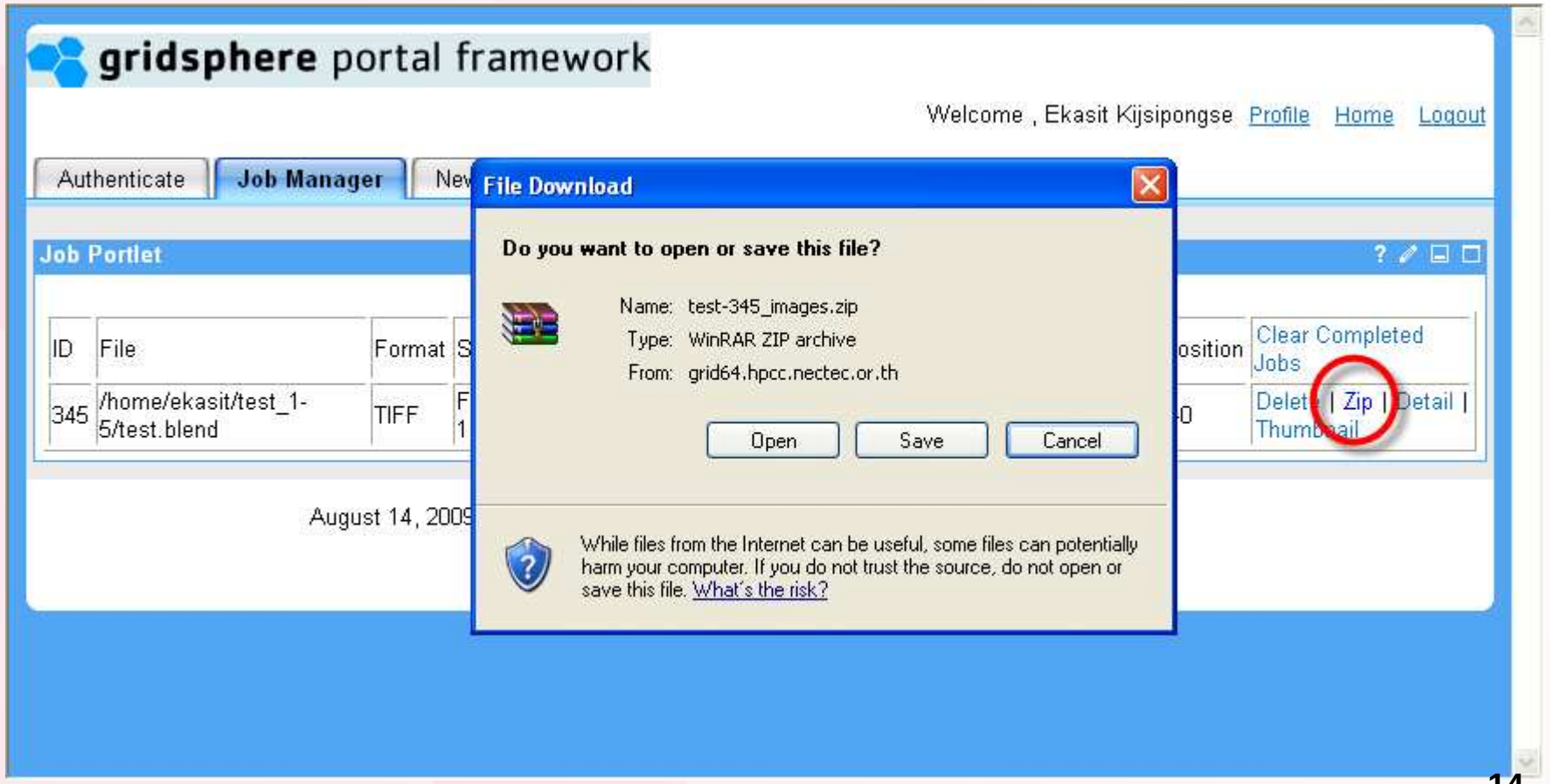


ID	File	Format	Submitted	Start Frame	End Frame	Size	Done	Waiting	Running	Position	Clear Completed Jobs
117	/home1/c00h03n/canon_1-1/canon.blend	TIFF	Tue Jun 30 10:08:15 ICT 2009	1	1	1	1	0	0	0-0	Delete | Zip | Detail | Thumbnail
118	/home1/c00h03n/canon_1-1/canon.blend	TIFF	Tue Jun 30 10:12:01 ICT 2009	1	1	4	4	0	0	0-0	Delete | Zip | Detail | Thumbnail
121	/home1/c00h03n/canon_1-1/canon.blend	TIFF	Tue Jun 30 10:27:44 ICT 2009	1	1	1	1	0	0	0-0	Delete | Zip | Detail | Thumbnail
343	/home1/c00h03n/01-opening_1-1/01-opening.blend	TIFF	Tue Jul 28 14:24:39 ICT 2009	1	1	1	1	0	0	0-0	Delete | Zip | Detail | Thumbnail
344	/home1/c00h03n/01-opening_1-1/01-opening.blend	TIFF	Tue Jul 28 14:25:21 ICT 2009	1	1	20	20	0	0	0-0	Delete | Zip | Detail | Thumbnail

Thumbnail Viewer



Retrieving Rendered Images



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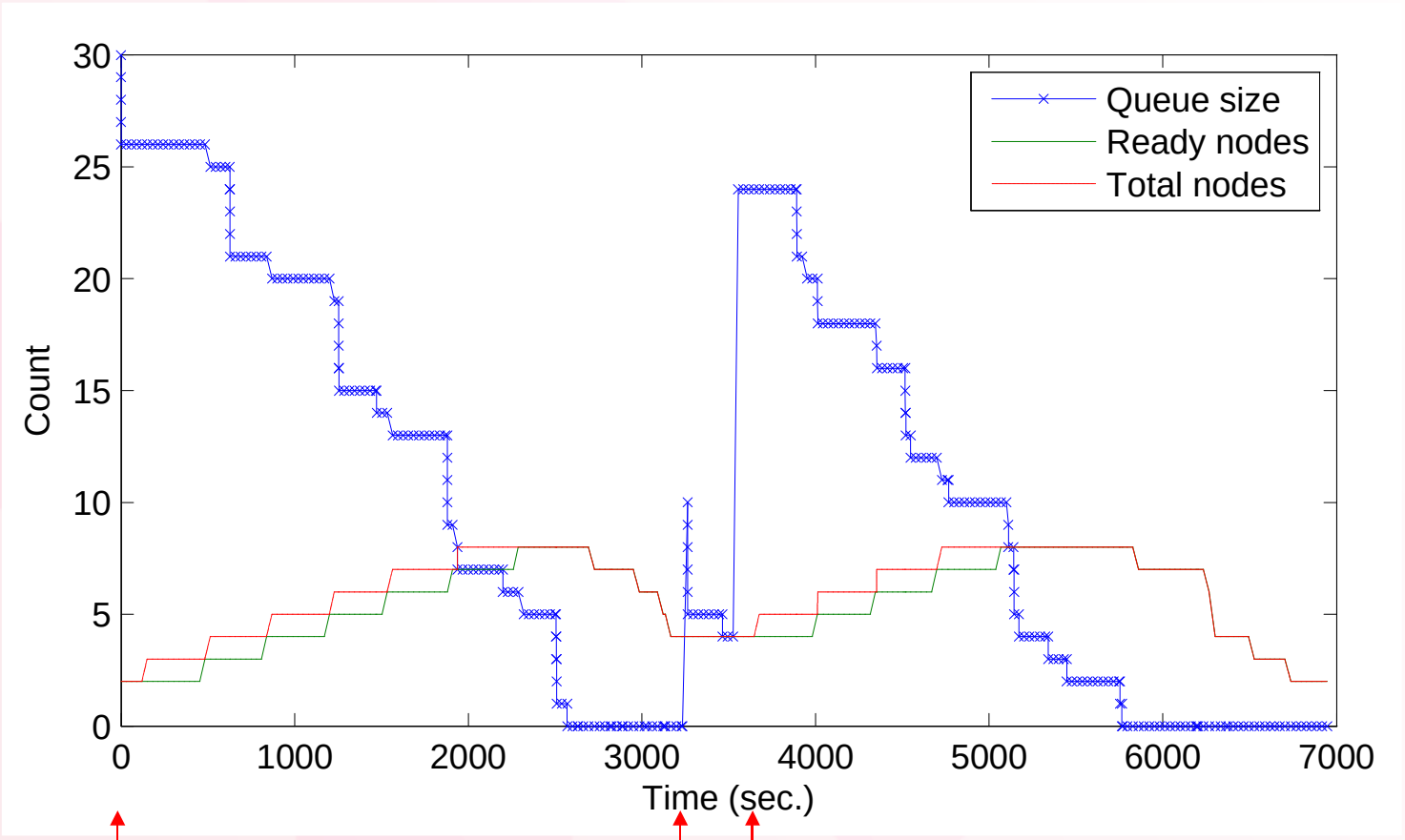
Render Output

Experiments

- Testbed
  - 2 local nodes
  - Up to 6 Cloud nodes (VMs)
- Workload
  - Big Bug Bunny
  - Each frame has the average rendering time 12 min for 25% full HD resolution

Growing and Shrinking on Demand

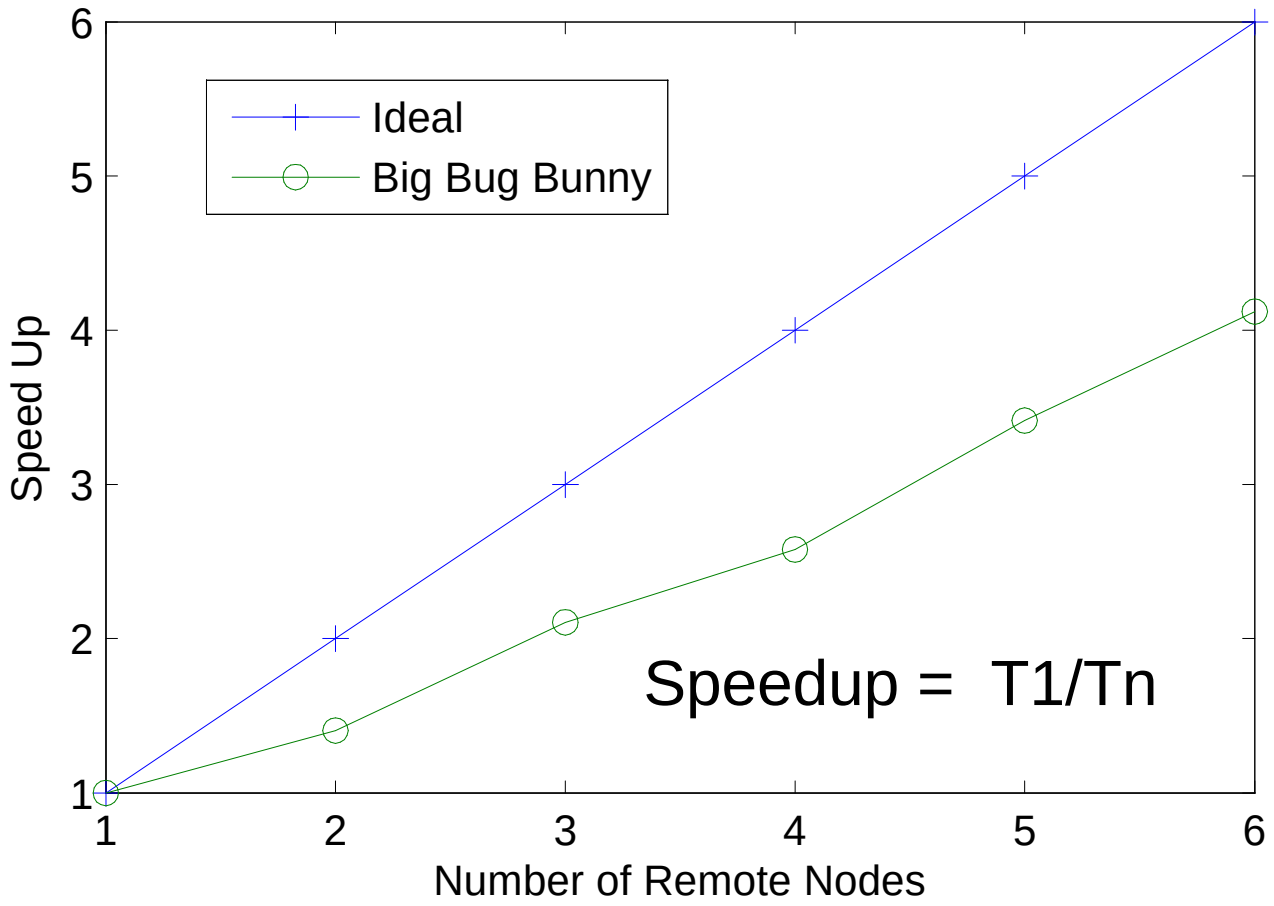


30 frames

10 frames

20 frames

Speedup


Ideal
Big Bug Bunny
Speedup = T1/Tn
Speed Up
Number of Remote Nodes
1
2
3
4
5
6

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Conclusions

- We develop a architecture for elastic render farm on Linux cluster using open source software
  - User friendly web interface
  - Secure data transfer
  - Grow and shrink the render farm automatically on demand to Cloud computing resource

- Future enhancement
  - Cost optimization
  - More Cloud platforms
  - More render engines

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Thank You

A Driving Force for National Science and Technology Capability

Portlet Technology

- Plugable user interface based on Java
- Java Portlet specification (JSR-286)
- Jetspeed, uPortal, GridSphere