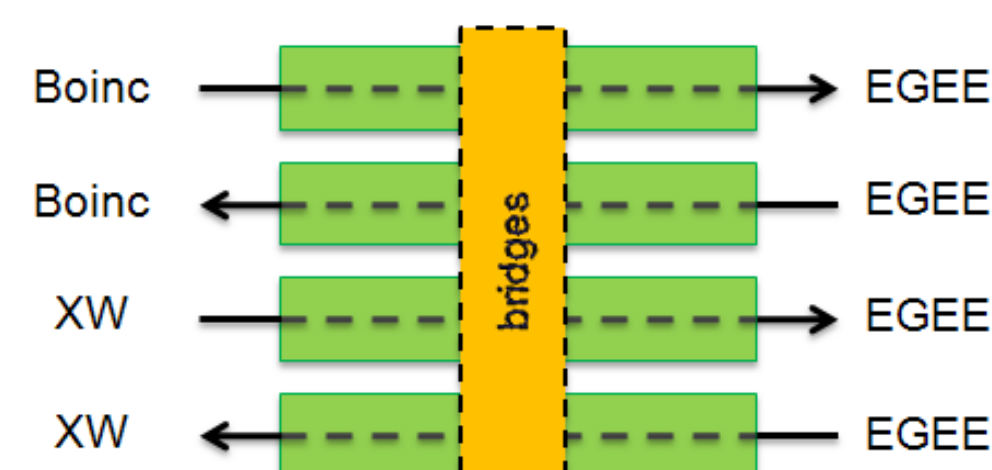


## Introduction

- BOINC, XtremWeb and EGEE are extremely successful Grids.
- They follow different paradigms:
  - BOINC and XtremWeb are DGs
  - EGEE is a SG
- How to send jobs from a SG to a DG and vice-versa?
- The EDGeS (The Enabling Desktop Grids for e-Science project) project aims to enable this.
- At the heart of the EDGeS project lays the 3G-Bridge. Jobs cross the 3G-Bridge in one direction, results in the other.



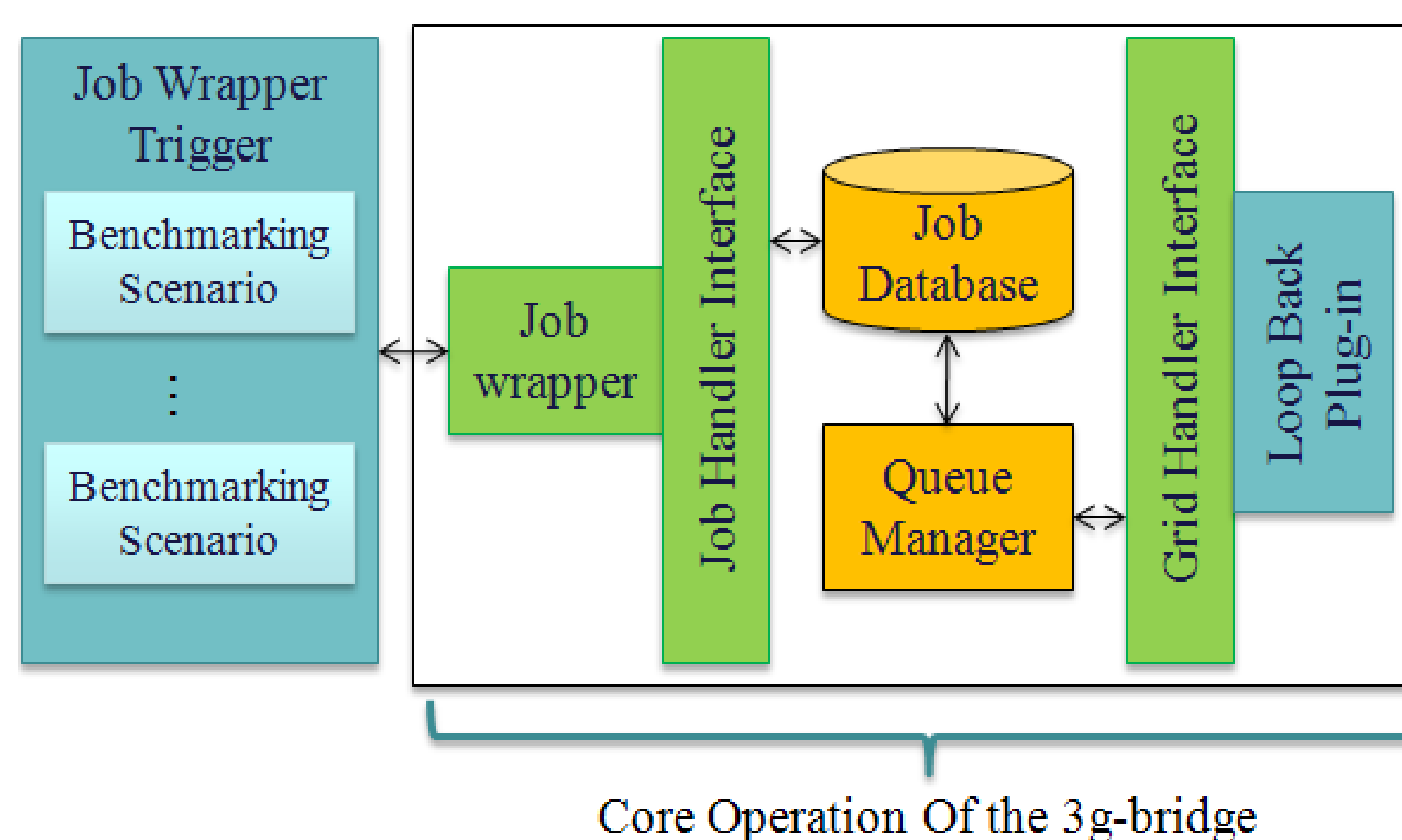
## Objectives

- The flows of jobs and results impose undesired overheads.
- These overheads can be of two types:
  - Latency, i.e., delays imposed on job completion,
  - Throughput, as the bridge can only handle a certain number of jobs per unit of time.
- Observing performance of the EDGeS infrastructure helps to:
  - Detect and identify system's bottlenecks.
  - System developers can do a better investment to modify the bridge.



## Benchmarking Approach

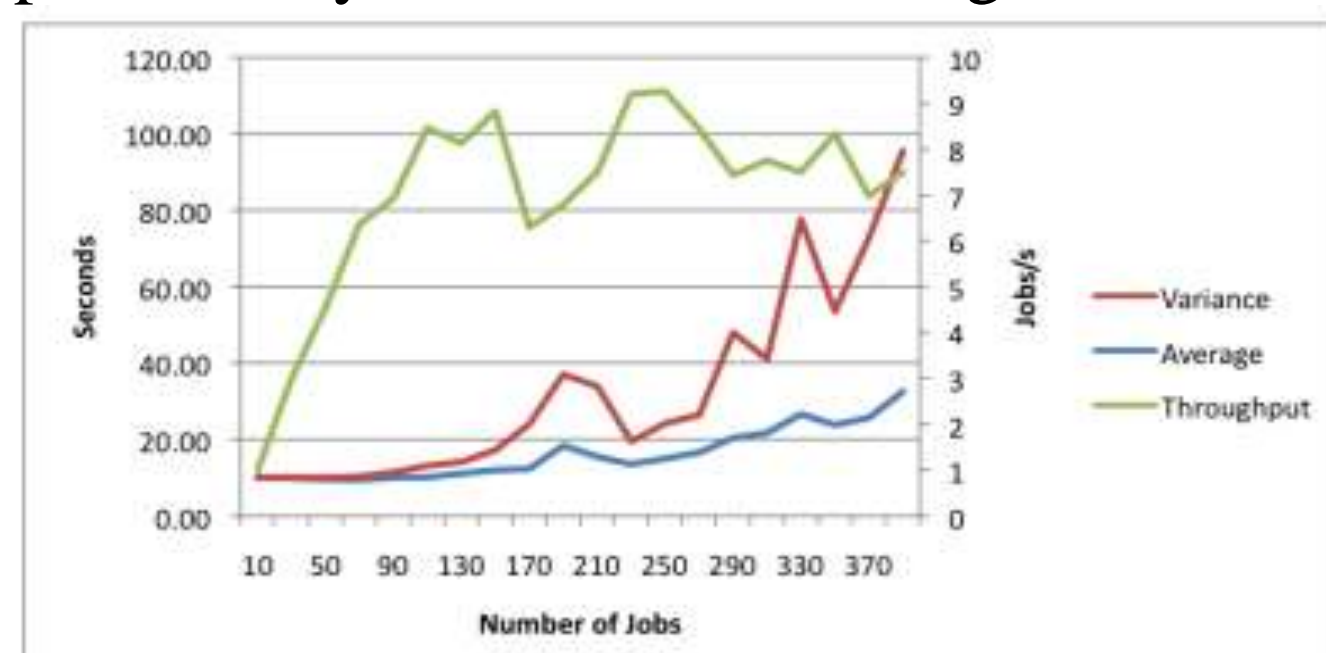
- The evaluation of the EDGeS infrastructure consists of three main parts:
  - Evaluation of the bridge disconnected from any infrastructure: We added a job wrapper that submits jobs directly to the bridge, and a loopback plug-in that fakes the role of a grid.
  - Evaluation of the DG→SG direction: We took care of a number of events, which are closely connected to the workflow that processes each WU.
  - Evaluation of the SG→DG direction: Similar to previous scenarios.



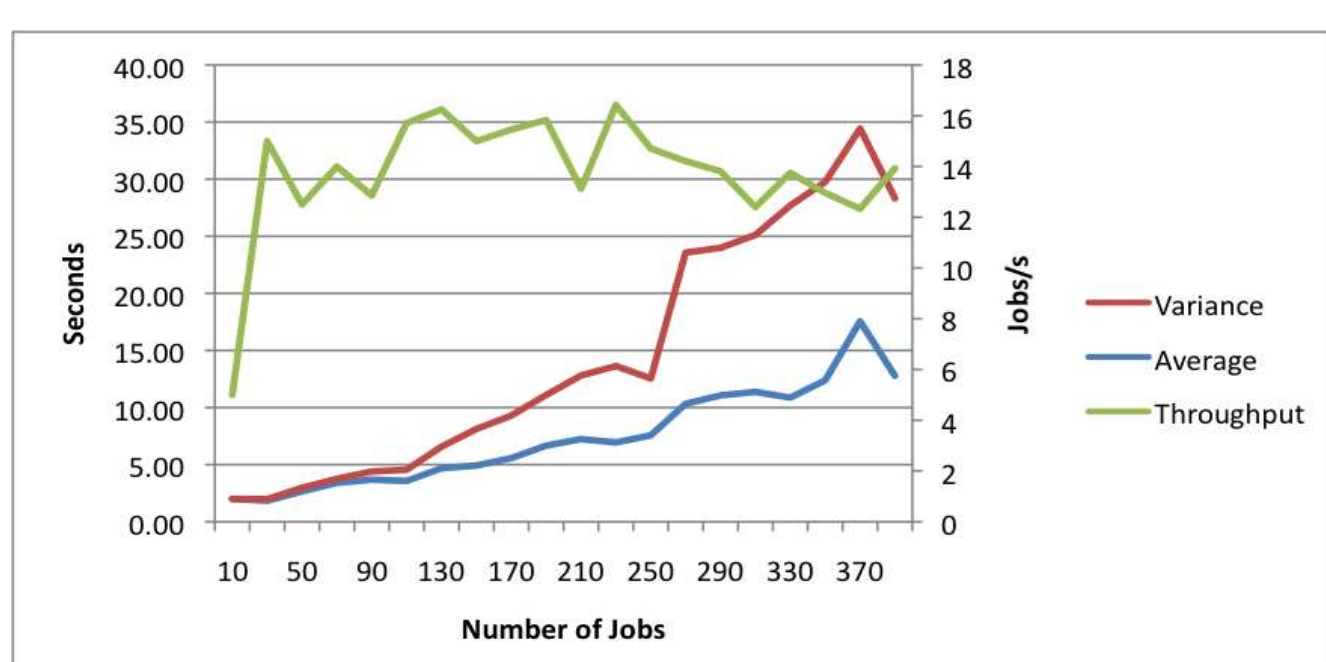
## Main Results

### Testing the core operation of 3G-bridge

Sending an increasing number of jobs periodically to unmodified bridge

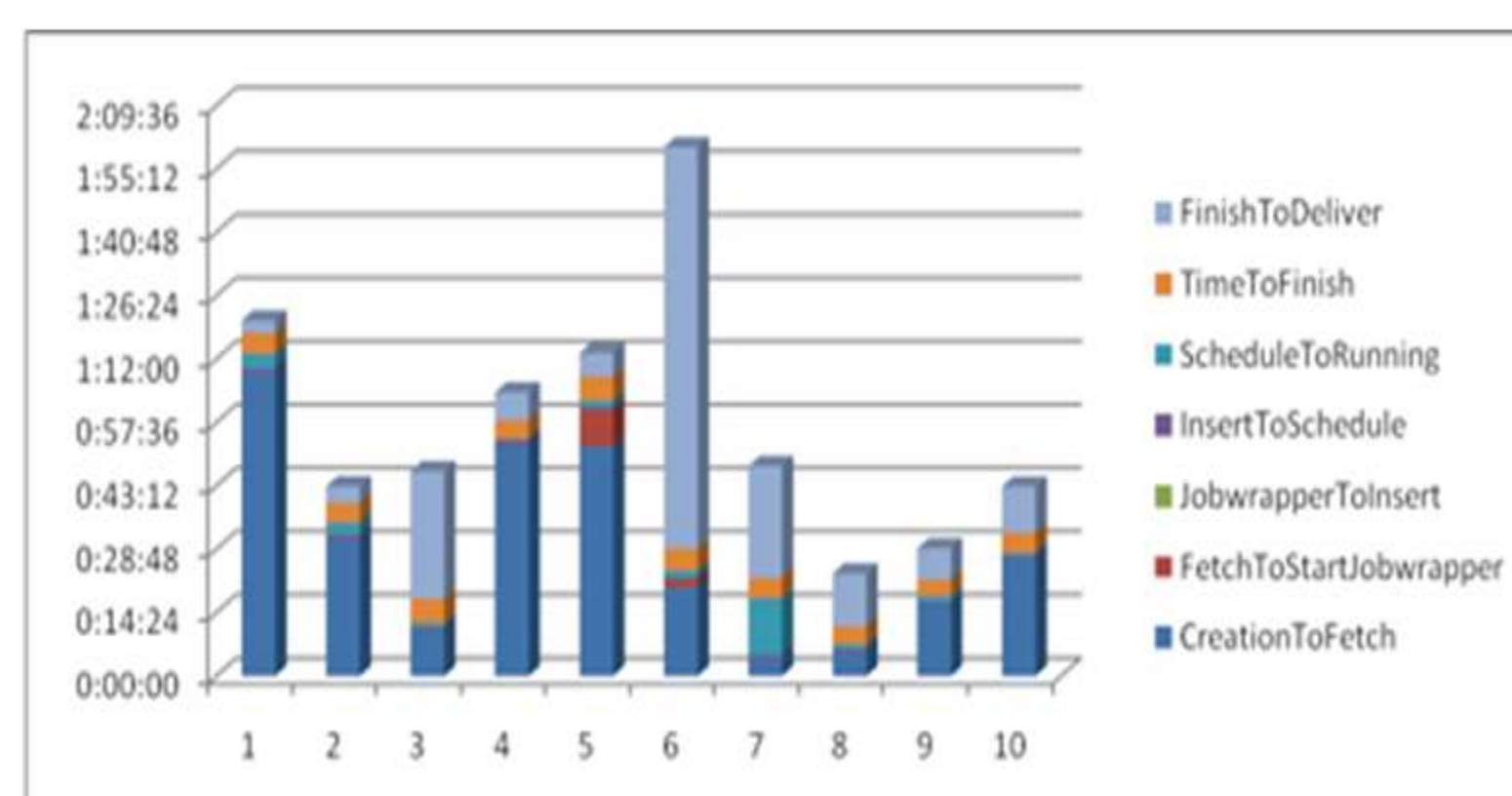


Modified bridge



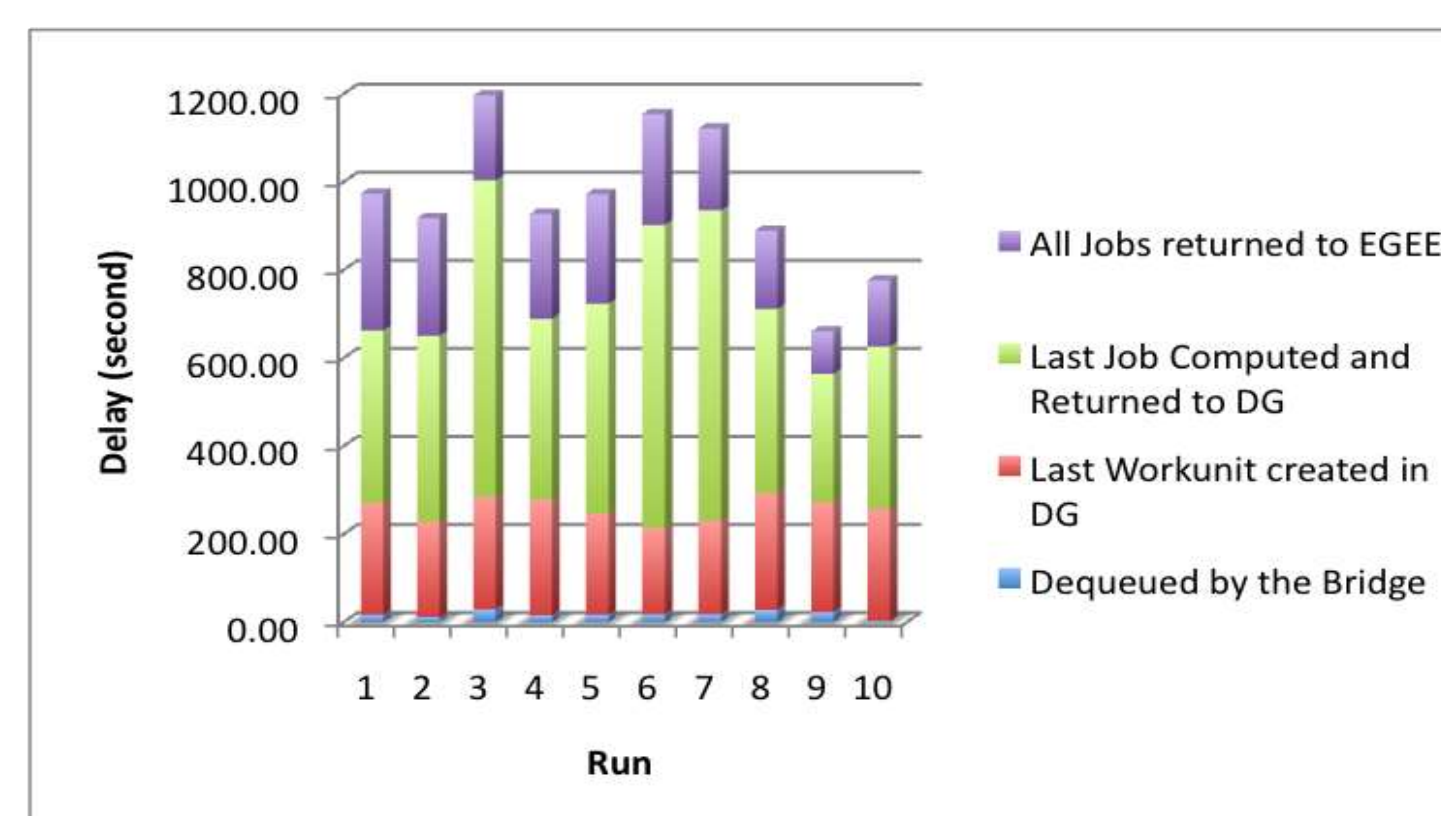
### Testing the DG->SG

A sequence of single job submissions. The most striking evidence is the huge variation in some of the time components from one run to the next. This effect is mainly due to: time to start the job and time to deliver the result. Both time components are related to polling timeouts.



### Testing the DG->SG

This figure depicts the overall time the batch consumes until completion, for 50 jobs. The time to dequeue the jobs in the bridge stays quite low for all the experiments. One clear tendency from this plot is that the dominance drifts away from delivering all the job results to EGEE to the creation and computation of the WUs.



## Conclusion

- Perhaps the most important conclusion of our work is that the EDGeS Infrastructure provides a bridge, which is efficient enough to bring together service and desktop grids.
- An appropriate tuning of the bridge timeouts is quite dependent on the scenarios where the bridge runs.
- Default values show poor performance in a couple of tests.
- We could double throughput of the 3G-Bridge, by reducing internal timeouts.
- Unfortunately, day-to-day operation may need more conservative timeouts.
- Future versions of the bridge should consider the internal use of **event-based** instead of **polling-based** communication.

## Acknowledgement:

The EDGeS project receives Community funding from the European Commission within Research Infrastructures initiative of FP7 (grant agreement Number 211727).

## References:

- <http://edges-grid.eu/>
- <http://boinc.berkeley.edu/>
- <http://www.xtremweb.net/>
- <http://www.eu-egee.org/>
- JRA1.1: Prototypes of Bridge from Desktop Grids to Service Grids. Deliverable DJRA1.1 of the EDGeS Project, June 2008.

By:

Naghme Ramezani Ivaki, Diogo Ferreira, Filipe Araujo  
naghme@dei.uc.pt, defer@student.dei.uc.pt, filipius@dei.uc.pt