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MEMORANDUM

DATE: May 11, 2006

TO: B. Berger, J. Dehmer, M. Goldberg
FROM: P. Brady, A. Lazzarini, M. Livny, R. Pordes
CC Craig Tull
SUBJECT: Cooperation between the PIF 2005 proposal from the LSC and the OSG proposal
Refer to: LIGO – M060075-00-Z

The OSG management and the LSC PIF proposers have discussed collaboration between the two proposals. The goals of this collaboration are to increase the benefit and effectiveness of both programs of work and to assure a coherent program of mutual benefit over the five years of the proposals.

In this memorandum, we identify scope that can be removed from the PIF proposal, where the OSG program of work would be able to provide support for the LIGO needs We identify areas in the OSG program of work which would provide such support. We also suggested increased collaboration between the two projects that might be expected to result in benefits in later years.

LSC's PIF proposal antedates the OSG proposal submission by more than five months. Subsequent to that time LSC has been an active proponent and participant in defining the OSG program to DOE and NSF. LIGO is making its resources accessible as part of the OSG distributed facility, with an expected 3000 CPUs being available by 2008. The LSCs participation in the OSG Consortium, to provide an effective common distributed infrastructure in the US, will be of significant benefit to future LIGO science. Moreover, LSC will also contribute to enhance the OSG's ability to serve and engage the broader scientific community. During the 5-year program of work of the PIF and OSG requests, the LSC will work diligently with the OSG to leverage the OSG infrastructure to the greatest extent possible; the OSG will work diligently to provide infrastructure which addresses the needs of the LSC. Integration of the LIGO Data Grid into the OSG constitutes part of the long term strategic cyber infrastructure plan of the LSC.

We have identified an overlap of ***3 LSC PIF FTEs per year*** that can be provided by the OSG program of work. The OSG makes a commitment to absorb and provide the scope of their activities to the LSC as a part of the OSG program of work. We note that the transfer of responsibilities outlined here effectively *zeros out the FY 2007 request for new personnel* to manage LDG specific Grid services and middleware as expressed in #3 of Table 1. In FY 2008-2011, the LDG still requires 3.5 FTEs to manage and develop LIGO specific aspects of grid services.

To ensure appropriate ongoing attention to the LIGO requirements and schedule, the LSC PIF PI technical project lead will be a member of the OSG Executive Board representing the technical aspects of the project.

Relevant Background

This memo begins with a brief contextual background of the LIGO Scientific Collaboration's (LSC) proposal to the PIF program. The proposal, entitled, "Enabling gravitational-wave astronomy on the LIGO Data Grid" requests a funding in the amount of $13.2M over a period of 60 months.

The success of the OSG depends on the strength of the application software and computing programs of the participating research groups, specifically including the LIGO Scientific Collaboration. OSG provides access to stakeholder owned resources as well as supporting the common, shared distributed cyber infrastructure on which the scientific collaborations manage and distribute their data, develop their applications, and schedule their jobs.

LIGO has been in production analysis for the past 4 years. To date, seven Physical Review D papers and two Physical Review Letters have been published with LIGO data using grid-based analysis and middleware tools successfully adopted by the LIGO Scientific Collaboration through its active participation in previous NSF ITR projects, predecessors to the LIGO PIF and OSG programs of work.

Unlike the LHC experiments, the LSC does not currently have an ongoing O&M grant from NSF to support the LSC in its computationally intensive scientific mission. In contrast, the US CMS collaboration requested and received funding in 2003 through a grant request originally through Northeastern University (Reucraft, PI – NSF award #0303841) and presently administered by UCLA (Cousins, PI – NSF award #0516857). To date, NSF has funded the US CMS effort for $11.8M; the grant continues through 2008.

Similarly, the US ATLAS collaboration requested and received funding in 2003 through a grant request from Columbia University (Tuts, PI – NSF award #0301292). To date, NSF has funded the US ATLAS effort for $16.9M; the grant continues through 2007.

The LSC PIF request is comparable in size and analogous to the above-cited already funded efforts which enable the LHC collaborations to carry out their scientific missions. It should be noted that, prior to submission, the LSC inquired with the NSF gravity program seeking guidance as to which NSF program to submit its proposal. The guidance received was to submit it to the PIF program.

The OSG depends on the strength of its stakeholders, specifically including the LSC, to support access to their resources from the OSG infrastructure, to develop and support the application systems that deliver their scientific results, and to enable their use of new IT tools.

It is appropriate today to reassess the LSC PIF proposal with the aim of determining what portion, if any, of the original scope proposed in the fall of 2005 fits more naturally today into the scope of the OSG proposal and where increased collaboration might be mutually beneficial over the longer term.

LSC specific needs

Table 1 shows the PIF request in terms of FTEs to support the LIGO Data Grid. These FTEs include systems administrators for the various LIGO Tier 2 centers outside LIGO Laboratory.

Table 1: LSC PIF 2005 request in terms of FTEs

Activity #	Description	FTEs 2007	FTEs 2008 - 2011
1	Systems administration	3.0	5.0
2	LIGO specific software management	6.0	10.0
3	Grid middleware	3.5	7.0
	Totals	***12.5***	***22***

Referring to the table, the request for 9 FTEs(2007)/15FTES(2008+) associated with activities #1 and #2 represent VO specific needs for the LIGO collaboration. These include LIGO VO-specific activities that are critical to maintaining and operating our distributed computing facility. They are not appropriate activities within the scope of the OSG and represent LSC needs that cannot be supplied by the OSG.

LSC needs that could be met by the OSG

Once again referring to Table 1, the PIF proposal, submitted well in advance of the OSG proposal, requested FTE support for activity #3 that today appears to be well aligned with the proposed OSG program of work. In principle, these FTEs could be excised from a revised LSC PIF request *if the scope is accepted by the OSG and the need is guaranteed by the OSG*.

These include:

1. LIGO Certificate Authority: **Reduce the PIF request by 1.5 FTEs**. LIGO requires a high level of control over issuing, revoking, and managing credentials in order to efficiently enable LIGO scientists. This is a place for good overlap with the OSG proposal. *If the OSG commits to delivering a satisfactory user support, the PIF can be reduced accordingly*. The LSC still needs 0.25 FTE to provide coordination and interaction on behalf of our VO with the OSG CA, to communicate and aid in the development/testing of LIGO specific friendly interfaces to the CA, and to maintain appropriate control and security.
2. Virtual Organization Management Service: **Reduce the PIF request by 1 FTE.** The usage model within the LIGO Data Grid requires fine grained control over user and group authorization and authentication. Presently, the LIGO Data Grid

relies on a labor-intensive approach involving e-mails, problem tracking systems, and system administrators to manage our VO. LIGO's current needs do not map well onto the OSG single-user per VO model; addressing this may require a significant investment in software development and/or configuration and administration. We realize this cannot scale and the LSC is committed to making changes over the course of the OSG program in order to bring its grid use model into compliance with the emerging OSG model. *If the OSG commits to hosting the VOMS for the LDG with the understanding that initially the requirements will differ from other VOs that are currently managed, then the PIF request can be reduced accordingly*. Again, the LSC still needs 0.25 FTE to provide communication with the OSG VOMS administrators and developers, and to maintain appropriate control and security.

3. VDT & Monitoring: **Reduce the PIF request by 0.5 FTE.** LIGO relies heavily on VDT to manage the software bundles needed by users and administrators. There is internal VO-specific need, however, to support our custom LDG Client on a broader class of platforms. LIGO uses a small subset of the standard VDT, so we do not fully integrate the entire VDT into our tools. *If we can strengthen the already close working relationship between LIGO VO staff and the VDT team, then the PIF can be reduced accordingly*. Again, LIGO needs 0.25 FTE in the PIF to provide communication with the VDT developers.

OSG provision of LSC needs identified in the LIGO PIF program of work

As stated above, the OSG proposal, which includes LIGO contributions and participation, was submitted several months after the LIGO PIF. LIGO is an important and significant collaborator in the OSG Consortium. It is the goal of the OSG Consortium to provide scientific benefit to its members through the development and support of a common distributed facility and services that may need to be configured and/or extended to meet the stakeholder needs, The scope of the OSG facility and science driven extensions programs of work appear to be well aligned with the LIGO PIF activity #3. For the specific items identified by LIGO as areas for support and collaboration:

1. The OSG depends on the ESNET DOE Grids Certificate Authority hosted and supported at LBNL. In the OSG proposal 0.5 FTE of effort is identified at LBNL to work with this project and ensure the OSG stakeholder requirements and needed capabilities are met. Through this and other identified security effort in the OSG Facility we would support LIGO and also work with the identified the LSC PIF 0.25 FTE to ensure that the collaboration needs are met.
2. OSG Operations hosts Virtual Organization Management Services on behalf of VOs (through VO-OSG agreements) as well as the OSG VOMS itself. The OSG will look into a reprioritization of Operations effort to leverage this effort in support of the LIGO VO management service. Other stakeholders in OSG, in particular the LHC, have VO management usage requirements that include fine grained control over user and group authorization and authentication. The Science Driven Extensions program within the OSG includes ensuring the continued integration and deployment of extended capabilities in this area. One of the FTEs in the extensions programs is co-located with the LIGO group at Caltech. This FTE can

be included as part of the Authorization project to ensure timely delivery to LIGO's requirements. OSG operations would also work with the identified LIGO 0.25 FTE to ensure good communication and support the appropriate LIGO control and security.

3. The OSG software and release activity includes the packaging and release of a common version of VDT to stakeholder requirements This activity also includes support for distributions to meet the specific needs of EGEE and TeraGrid. Through a continuation of the close working relationship between LIGO and VDT we will include LIGO needs by reprioritizing this other specific support. We will collaborate on the support of the existing LIGO distribution system while validating and deploying a longer term solution which maintains robustness while gaining in commonality and effectiveness. We expect that this will take up to a year to complete and that gains should be evident for the final 4 years of the programs of work.

To ensure appropriate ongoing attention to the LIGO requirements and schedule, the LSC PIF PI technical project lead will be a member of the OSG Executive Board representing the technical aspects of the project. This is in line with the OSG collaboration model of work with external projects as described in the Management Plan. OSG will also continue to better understand the LIGO data management and analysis requirements for extensions to and support from VDT components, specifically RLS and Pegasus – to ensure that the OSG program of extensions meets the ongoing needs of the collaboration.

Proposed realignment of PIF scope to the OSG

Concluding, we propose that ***3 LSC PIF FTEs per year*** be dropped from the PIF proposal. The OSG makes a commitment to absorb and provide the scope of their activities to the LSC as a part of the OSG program of work. The revisions are shown in Table 2 below.

Table 2: Revised LSC PIF request in terms of FTEs

Activity #	Description	FTEs 2007	FTEs 2008 - 2011	Comment
1	Systems administration	3.0	5.0	Same as before
2	LIGO specific software management	6.0	10.0	Same as before
3	Grid middleware	0.5	4.0	***Reduced by 3 FTEs***
	Reduced totals	***9.5***	***19***	

We note that the transfer of responsibilities outlined here effectively *zeros out the FY 2007 request for new personnel* to manage LDG specific Grid services and middleware as expressed in #3 of Table 1. In FY 2008-2011, the LDG still requires 3.5 FTEs to manage and develop LIGO specific aspects of grid services.