

# Open Science Grid (OSG) Ticket Synchronization: Keeping Your Home Field Advantage In A Distributed Environment

**Kyle Gross, Soichi Hayashi, Scott Teige, & Robert Quick**

Indiana University – University Information Technology Services

kagross@iu.edu, hayashis@iu.edu, steige@iu.edu, rquick@iu.edu

**Abstract.** Large distributed computing collaborations, such as the Worldwide LHC Computing Grid (WLCG), face many issues when it comes to providing a working grid environment for their users. One of these is exchanging tickets between various ticketing systems in use by grid collaborations. Ticket systems such as Footprints, RT, Remedy, and ServiceNow all have different schema that must be addressed in order to provide a reliable exchange of information between support entities and users in different grid environments. To combat this problem, OSG Operations has created a ticket synchronization interface called GOC-TX that relies on web services instead of error-prone email parsing methods of the past. Synchronizing tickets between different ticketing systems allows any user or support entity to work on a ticket in their home environment, thus providing a familiar and comfortable place to provide updates without having to learn another ticketing system. The interface is built in a way that it is generic enough that it can be customized for nearly any ticketing system with a web-service interface with only minor changes. This allows us to be flexible and rapidly bring new ticket synchronization online. Synchronization can be triggered by different methods including mail, web services interface, and active messaging. GOC-TX currently interfaces with Global Grid User Support (GGUS) for WLCG, Remedy at Brookhaven National Lab (BNL), and Request Tracker (RT) at the Virtual Data Toolkit (VDT). Work is progressing on the Fermi National Accelerator Laboratory (FNAL) ServiceNow synchronization. This paper will explain the problems faced by OSG and how they led OSG to create and implement this ticket synchronization system along with the technical details that allow synchronization to be preformed at a production level.

## 1. Overview of the GOC and our Ticketing Concerns

The OSG Operations Center (GOC)<sup>[1]</sup> at Indiana University handles ticket routing between many different collaborators, each using different ticketing systems. OSG Operations acts as a central communication hub for Open Science Grid<sup>[2]</sup> and therefore is the gateway for ticketing systems from various peering grids and Virtual Organizations (VO) to interact with one another. The traditional

ticket exchange method of parsing emails was shown over time to be very unreliable. This caused missed incoming tickets and for tickets sent to other ticketing systems to sometimes end up misrouted internally on the receiving end. These problems were deemed unacceptable by OSG Operations and the GOC took initiative to create a reliable exchange system that would work for users that would rather work in their own ticketing environments (USATLAS RT<sup>[3]</sup>, GGUS<sup>[4]</sup> Remedy<sup>[5]</sup>, FNAL ServiceNow<sup>[6]</sup>) than use the public ticketing interface.

## 2. Review of what was accomplished in the past

At CHEP 2010, the GOC presented a paper showcasing GOC-TX<sup>[7]</sup> as our solution to the many problems we faced day-to-day with ticket exchanges. GOC-TX is a reliable application that allows for the exchange of tickets between multiple ticketing systems. It bypasses the need for parsing emails to exchange information and instead relies upon a highly customizable web-services interface to insure proper ticket synchronization. Figure 1 illustrates how the different components of GOC-TX interact with various ticketing systems.

GOC-TX was quite successful at improving ticket exchange reliability but as time went on, users and their VOs began asking for more features. The most complicated of these features was attachment handling. Users needed to be able to upload and exchange attachments with various ticketing systems. This, plus the need to complete the exchange with Fermilab's ServiceNow ticketing system, brings us to the subject of this paper.

## 3. New features added since CHEP 2010

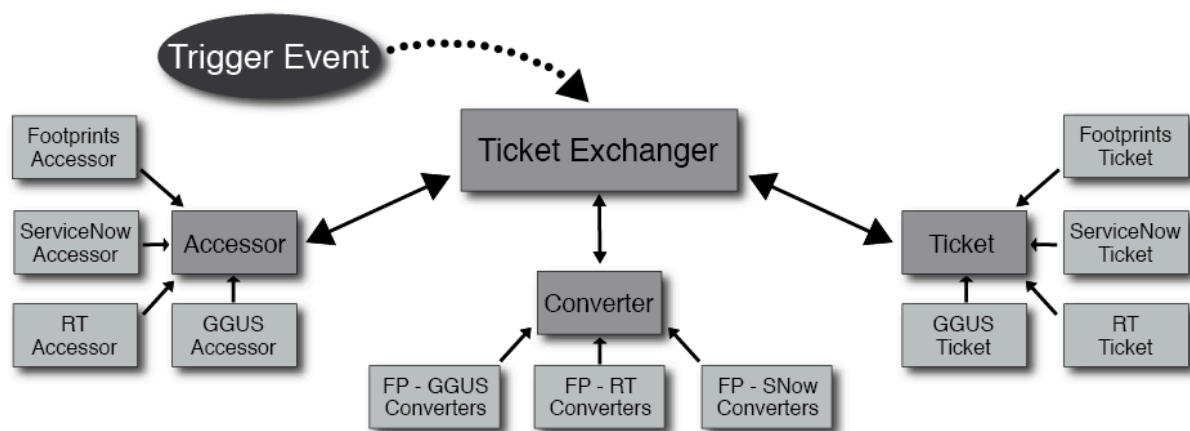


Figure 1: Inside GOC-TX

### 3.1. Fermilab ServiceNow

Attempts were made at creating a working ticket exchange with Fermilab (FNAL) Remedy, but unfortunately, due to some technical limitations, GOC-TX was unable to properly synchronize tickets. Remedy was being used in a two-tier fashion at FNAL. The first instance of Remedy was used to receive tickets and those tickets were then forwarded to another internal Remedy instance. This meant that while GOC-TX could submit tickets to FNAL's Remedy system, it was unable to update or receive updates once the ticket was forwarded to the internal instance. This, coupled with various logistical issues such as network policies, made finding a workaround increasingly challenging.

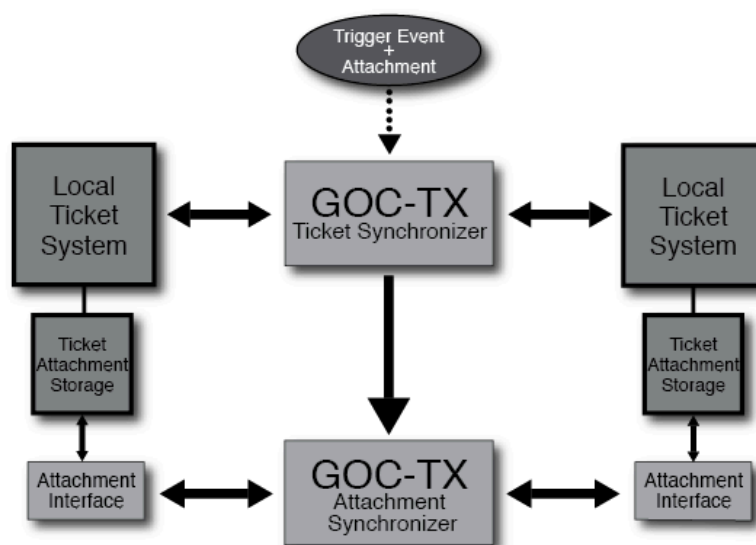
Eventually, it was revealed that FNAL would be transitioning from Remedy to ServiceNow, which would provide us with a much more viable interface to implement a GOC-TX exchange. FNAL's ticketing setup was slightly more complicated than other ticketing systems as they support many OSG VOs and need more advanced ticket routing to insure that tickets end up in the proper hands.

GOC made topology changes to the OSG Information Management (OIM) system by adding an extra piece of data for support entities. This piece of information, called the External Assignment ID, allows GOC-TX to include metadata for other ticketing systems to use to determine exactly which support unit should handle any given ticket. Using the afore-mentioned customizable interface and this new metadata, GOC-TX could now allow ServiceNow to fully understand the intended routing of any ticket exchanged with it via the GOC ticketing interface. In late January 2012, USCMS was the first FNAL VO to go fully online using the new GOC-TX – ServiceNow ticket synchronization scheme. After a short time, all other FNAL ticket destinations were transitioned to use GOC-TX. To date, the implementation has been reliable.

### 3.2. Attachment Handling

GOC-TX is now able to handle attachment exchange and storage. This was asked for by the USATLAS VO as it is inconvenient to have to go to another ticketing system to get an attachment referenced in an exchanged ticket. For example, ATLAS users wanted to stay within their home ticketing systems and receive attachments from a GGUS ticket.

To achieve this, an investigation was started to determine how each ticketing system handled attachments.<sup>[8][9]</sup> The investigation revealed certain technical challenges that have caused us to make attachment exchange highly independent of the actual ticket exchange itself. This insures that any problems with attachments will not cause larger issues with the overall ticket synchronization process. With this knowledge, GOC was able to move forward and create functions that will allow the exchange of attachments. Figure 2 gives an overview of how the different functions and components relate to one another.



**Figure 2: Attachment Handling**

3.2.1. *GGUS Attachments.* Investigation of the GGUS attachment system was done and it was determined that GGUS maintains a list of attachments associated with every ticket and each attachment has an ID that is unique across all GGUS ticketing instances. Three SOAP accessors were created to handle the exchange of attachments with the GGUS system:

- listAttachment – enumerates attachments associated with any given GGUS ticket
- putAttachment – uploads attachments to a GGUS ticket and returns a new attachment ID from GGUS

- `getAttachment` – obtains attachments from GGUS tickets as well as any specific details of the attachment.

3.2.2. *RT Attachments*. Investigation of the USATLAS RT attachment system was done and it was determined that RT creates a unique ID for each attachment within a ticket and stores the attachment as part of the ticket commentary. As attachments are considered comments within each RT ticket, users cannot edit and/or remove attachments once they are associated with a ticket. Three REST accessors were created to handle the exchange of attachments with the RT system:

- `listAttachment` – enumerates all attachments associated with any given RT ticket
- `putAttachment` – uploads attachments to an RT ticket, but RT will not provide a new attachment ID automatically. Therefore, the accessor immediately calls `listAttachment` to retrieve an updated list of attachments and their IDs for the RT ticket.
- `getAttachment` – obtains attachments with a specific ID from inside an RT ticket.

3.2.3. *Footprints Attachments*. The Footprints<sup>[10]</sup> ticketing system used by the GOC to track trouble tickets does not provide an interface that allows one to access attachments. After attempting to find a way around this limitation, it was decided that the best course of immediate action was to store attachments on a local GOC fileserver associated with our public ticketing interface. While this does not allow for the direct exchange of attachments with Footprints itself, it does allow our users to exchange attachments between GGUS and RT and upload attachments to the GOC Ticket web interface. Plans are currently being developed to allow the exchange of attachments via email and directly with Footprints, but they have currently not been implemented.

3.2.4. *GOCTicket Attachments*. The GOC public ticketing interface (GOCTicket)<sup>[11]</sup> allows x509 certificate-authenticated users to upload attachments to any ticket using a simple HTML5 drag-and-drop interface. Users can simply drop files into the specified area and remove files by clicking the appropriate icon. The attachments will be exchanged with other ticketing systems if they are assigned to the ticket. It should also be noted that attachments from this interface will not be recognized by Footprints as Footprints provides no interface for this. Conversely, this interface will not recognize attachments sent to directly Footprints via email. To overcome this technical limitation, there are plans to allow GOCTicket to completely handle the inbound and outbound emails for Footprints, which will allow GOC-TX to access Footprints attachments before they are moved into the Footprints system. Once the attachment is obtained, the rest of the ticket can be sent to Footprints and the ticket will be handled as expected. While this is not an ideal system, it does provide the vast majority of our users the attachment exchange functionality they need.

#### 4. Maintaining A Ticket Synchronization Service

To maintain a service such as GOC-TX, there are three main issues that must be dealt with. These issues are updates to external ticket systems, updates to the GOC ticket converter and accessors, and bug fixes on GOC-TX itself.

Ticket services such as GGUS and ServiceNow routinely update their interfaces which causes Operations to have to compile the client stub and update field mappings if there are changes to the fields that GOC-TX exchanges. These changes usually happen with enough notice that we are able to update and test against a test instance before the actual production release happens. As part of the commissioning process, when a ticket exchange is established with a site, we discuss and agree upon appropriate forms of communication to announce upcoming changes.

Occasionally, changes are made to fields on our end of the ticket exchange. Usually these changes are adding or removing a ticket field. For example, when we stopped using Footprints' Destination VO field, the metadata conversion had to be removed so that GOC-TX no longer passed VO

information from GGUS. These changes are developed and tested as part of usual Operations service update cycles.

Finally, even though they are quite rare, we must sometimes make bug fixes to GOC-TX itself. For example, early in the attachment handling process, it was discovered that GOC-TX was having a problem handling reverse attachment synchronization. The attachment sync algorithm wasn't inserting the correct attachment ID in the GOC-TX table, which resulted in duplicate entries. A change was implemented that reversed the order that TO and FROM fields were being set, which corrected the problem. This bug fix was rolled out as part of our routine maintenance schedule.

## 5. Conclusion

The GOC has implemented a reliable and robust ticket synchronization system that is scalable and will provide enhanced ticket exchange capabilities for years to come. Plans are underway to enhance and expand GOC-TX's feature set by creating a more comprehensive attachment handling system and improve ticket exchange reliability beyond what is currently implemented. As new ticketing exchanges are required, GOC will be able to easily adapt GOC-TX to meet the needs of users.

## References

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