Gemini Observatory

Version

Nicolas A. Barriga, Carlos Quiroz, Arturo Núñez

/03

Created: May 27, 2011

Modified: April 2, 2012



**Change Record**

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Date** | **Author** | **Notes** |
| 01 | May 27, 2011 | Nicolas A. Barriga | First Version |
| 02 | May 30, 2011 | Carlos Quiroz | Added GDS-OCS interface |
| 03 | Apr 2, 2012 | Carlos Quiroz | Addition of external GDS Events  Support of Boolean keywords |

Table of Contents

1 Introduction 1

1.1 Document Purpose 1

1.2 Intended Readership 1

1.3 Conventions 1

1.4 Acronyms 1

1.5 Reference Materials 1

2 Overview of the Gemini Data Service 2

3 GDS <-> OCS Interface 3

3.1 GDS <-> ODB Interface 3

3.2 GDS <-> Seqexec Interface 3

3.3 GDS <-> EPICS Interface 3

4 GDS <-> Instrument Interface 3

# Introduction

This document provides a description of the Gemini Data Service (GDS) Interface to the Gemini software.

## Document Purpose

The purpose of this document is to present the GDS interface to the different Gemini systems.

This document does not rehash the critical information in references [[1](#Kim1)] and [[2](#Kim)]. It is assumed that the reader has read these other documents and understands their content.

## Intended Readership

The intended audience for this document is *groups who are writing software, design review documents or providing operational support* *for Aspen instruments*.

## Conventions

The GDS is still under active development and things that are expected to undergo some changes are marked like this paragraph with a yellow exclamation point. There are not many of these situations in this document.

Code examples and individual methods are written in a fixed-width font like this: unsubscribeToStatus.

## Acronyms

ACM Action Command Model

CMS C++ Messaging Service

DHS Data Handling System

GIAPI Gemini Instrument Application Programmer Interface

GMP Gemini Master Process

GSDN Gemini Data Storage Network

ICD Interface Control Document

JMS Java Message Service

PCS Primary Control System

TCS Telescope Control System

TLC Top Level Computer

WCS World Coordinate System

GDS Gemini Data Service

## Reference Materials

x

|  |  |
| --- | --- |
| [1] | Kim Gillies and Arturo Nunez, "Aspen GIAPI Design and Use," 2006. |
| [2] | Kim Gillies, "Guidelines for Designing Gemini Aspen Instrument Software," 2004. |
| [3] | FITS Standard Specification. [Online]. http://archive stsci.edu/fits/fits\_standard/fits\_standard.html |

x

# Overview of the Gemini Data Service

Add general description of the GDS. Take from doxygen docs. Add a few diagrams

## GDS Configuration

The GDS is configured by editing the file $GMP\_HOME/conf/gds-keywords.conf.

The GDS configuration will change once the Configuration GUI is done.

The configuration file looks like this:

#

# Instrument Event Keyword Name FITS Data Gemini Null Subsystem Subsystem Array Comment

# Name in FITS Header Type Mandatory Value channel Index

# ---------- ---------- --------- ------- ------ ------- ----- ------ --------- ----- -------------------

# GPI OBS\_END\_ACQ AIRMASS 0 DOUBLE F NONE EPICS ws:massAirmass NULL "Mean...”

...

|  |  |  |
| --- | --- | --- |
| **Column Title** | **Column Description** | **Possible Values** |
| Instrument Name | Instrument for which this keyword is valid | GPI |
| Event | Observation event that trigger the collection of this keyword's value | OBS\_PREP, OBS\_START\_ACQ, OBS\_END\_ACQ, OBS\_START\_READOUT, OBS\_END\_READOUT, OBS\_START\_DSET\_WRITE, OBS\_END\_DSET\_WRITE |
| Keyword Name in FITS | Keyword name as it will appear in the FITS file | Any alphanumeric string of length <= 8 |
| FITS Header | In which header should this value be: primary (0) or an extension (1-) | 0, 1, 2... |
| Data Type | FITS data type | DOUBLE, INT, STRING, BOOL |
| Gemini Mandatory | Is this a mandatory keyword? | T, F |
| Null Value | Value to write in case the actual value can't be retrieved | Any alphanumeric string |
| Subsystem | Which subsystem provides this value | EPICS, STATUS, SEQEXEC, ODB, CONSTANT, INSTRUMENT |
| Subsystem Channel | Name of the channel in the subsystem, where the keyword value can be retrieved (ex. An EPICS channel, a status item name, etc...) |  |
| Array Index | If the channel is an array, which element to retrieve. Put 0 if channel is not an array. | 0, 1, 2... |
| Comment | Comment accompanying the keyword in the FITS file | Any alphanumeric string |

## Supported FITS Data Types

The following FITS Data Types are supported in GDS

|  |  |
| --- | --- |
| FITS Data Type | GDS Data Type |
| Character String | STRING |
| Logical | BOOL |
| Integer | INTEGER |
| Real Floating Point Number | DOUBLE |

Table 1: Supported FITS Data Types

Complex numbers are not supported

## Data Types Conversion policy

# GDS to OCS Interface

## GDS to ODB Interface

The GDS can interface with the ODB if it needs to store information available in the database that cannot be found anywhere else. The interaction with the ODB is more complex than with other modules as the ODB handle programs indexed by a program ID. The interface of the observation events does not include this information as the instrument does not have access to the ODB and it also needs to support engineering observations that don’t have a program ID.

Thus GDS has the concept of a Program ID Database, which must be populated with a link between the program ID and the observation data label. This DB needs to be populated **before** an observation command is sent to the instrument. The GDS uses this information to query the ODB.

Is recommended that the data collection from the ODB is always performed on the OBS\_PREP observation event. GDS will use the event’s data label to find the program ID and issue the query to the ODB. The items that that ODB can collect and store in the FITS file must be stored in the GDS configuration file and conform to the list of available items in Table 1:

|  |  |  |
| --- | --- | --- |
| Channel Name | Meaning | Data Type |
| odb:piFirstName | Principal Investigator’s First Name | STRING |
| odb:piLastName | Principal Investigator’s Last Name | STRING |
|  |  |  |

Table 2: Supported ODB channels

## GDS to Seqexec Interface

Before issuing an **observe** sequence command, the seqexec must provide GDS with a datalabel associated to a program ID. The datalabel is currently obtained from the DHS in the same way as for other instruments. The FITS keyword/value pairs to be stored in the FITS file must also be provided. Communication is performed through XMLRPC calls. The server accepts the following calls:

|  |  |  |
| --- | --- | --- |
| Method Name | | Parameters |
| openObservation | | dataLabel:String,  programID:String  keywordValue:[String|Int|Double] (Optional) |
| storeKeyword | | dataLabel:String,  keywordName:String, keywordValue:[String|Int|Double] |
| storeKeywords | dataLabel:String,  keywords:String, keywords:String (With format KEY,TYPE,VALUE) | |
| closeObservation | | dataLabel:String,  keywordName:String, keywordValue:[String|Int|Double] |
|  | |  |
|  | |  |
|  | |  |
|  | |  |

## GDS to EPICS Interface

GDS con insert into a FITS keyword any values that can be read from an EPICS database. To do so, the configuration file needs to specify that channel name that is being read and the array index if necessary.

# GDS to Instrument Interface

According to [[1](#Kim1)], section 9, “An instrument must provide information describing its state and health to Gemini”. This status information is provided via status items, which, among other things, contain the status name, data type and current value. The GDS collects some of the status information published, in order to add it the FITS[[3](#FIT)] file generated by the instrument.

The data collection is done at specific points during an observation, called observation events, described at [[1](#Kim1)], section 13.4, which published by the instrument. The following table contains the status items that will be collected, the keyword name to be used in the fits file, the observation event in which it will be collected and its data type.

|  |  |  |  |
| --- | --- | --- | --- |
| Status Item | FITS Keyword | Observation Event | Data Type |
| gpi:status | STATUS | OBS\_START\_ACQ | DOUBLE |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |