CTMO Manager Documentation

Release 1.0a1

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Jun 26, 2019

Contents

The CTMO Manager is a collection of installable daemons (services) to automize telescope operations.

The communication between modules is done using the XML-RPC protocol over sockets. This allows the modules to be distributed on different machines, as well as a single computer.

CHAPTER 1

Contents:

1.1 Installing CTMO Manager

1.1.1 Requirements

To install this software you need

- Python 3.6 installed, preferably in a virtual environment or a local installation.
- Linux or MacOS operating system.
- Root or sudo access.

1.1.2 Installation

To install, clone the CTMO Manager repo and run the makefile. Preferably use a virtual environment:

```
$ git clone https://github.com/CTMObservatory/CTMO_Manager.git
$ cd CTMO_Manager
$ mkvirtualenv -p python3 ctmo
(ctmo)$ make
(ctmo)$ sudo make install
```

Installation requires root privilege. Root is only used to install the systemd or launchd services.

Depending on your operating system, this will install two system services named `telescope` and `scheduler` under `/etc/systemd/system` (the default path to install services in Linux) or `/Library/LaunchAgents` (the default path to install services in MacOS); and a configuration file under `/etc/ctmo`

1.1.3 Uninstall

To clean (delete intermediate files) and uninstall:

```
$ make clean
$ sudo -H make uninstall
```

1.2 Configuring your system

Before you start the services you may have to configure your manager to work with your system.

1.2.1 Configuration file

Open the configuration file located in `/etc/ctmo/ctmo.conf.yaml`. Inside you will find a YAML configuration file for the services.

Scheduler Address

HTTP: The full address and port to locate the `scheduler` service on the net.

IP: The IP address of the server running the `scheduler` service.

Port: The port for the address of the server running the `scheduler` service.

Telescope Address

See *Scheduler Address*.

Logging

File: File path to the log file that will be used to log. Default is `/etc/ctmo/logs/ctmo.log`.

Log Level: One of `DEBUG`, `INFO`, `WARNING`, `ERROR`. Default: `INFO`.

1.3 System Services

1.3.1 Starting the services

Once the system is properly configured (see *Configuring your system*), you can start, stop or restart any of the services.

The operations to do so are different in Linux and MacOS. Both require root or sudo privilege.

Linux

On Linux, to start the scheduler service you would run:

```
$ systemctl start scheduler
```

and similarly for other modules. Now the system is ready to receive work orders through the network.

For more information, visit systemd wikipedia page or the official documentation.

MacOS

On MacOs, to start the scheduler service you would run:

```
$ launchctl load /Library/LaunchAgents/org.ctmo.scheduler
```

and similarly for other modules. To stop, use the `unload` command.

For more information, see launchd's page or Apple's official documentation.

1.3.2 XML-RPC Interface

Each service will run as a daemon (background process) and work on a specific port specified in the configuration file using the XML-RPC protocol.

Each service responds to a single function called `front_desk` which accepts a "Work Order".

Work Orders (WO) are dictionaries with a specific structure described in *Work Orders*.

1.4 Work Orders

The basic structure of a work order is as follows:

```
work_order = {
    "ID": "1",
    "WOType": "Observation",
    "Priority": None,
    "Datetime": "2019-03-05T14:34:54.234",
    "User": "Main Module",
    ...
}
```

`WOType` should be one of the following: `Observation`. `Priority` is assigned by the `scheduler` module when receiving the WO. It will be a float number in the range 0-10.

1.4.1 Telescope WO Format

Work Orders sent to a telescope must contain the `WOType` keyword set to the string `Observation` as well as other keywords relevant to an observation.

Below is an example.

```
work_order = {
    "ID": "1",
    "WOType": "Observation",
    "Priority": 1.3,
    "Datetime": "2019-03-05T14:34:54.234",
    "User": "Main Module",
    "Telescope Name": "CTMO",
    "RA": 23.1,
    "Dec": 13.2,
    "Filter": "I",
    "Exposure Time": 30.0,
    "Number of Exposures": 1,
```

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```
    "Type of job": "Research",
    "Type of object": "Galaxy",
    "Calibration Frames": "Yes",
    "Output": "Analysis",
}
```