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The LSST Scheduler Overview and Performance

(Dated: February 26, 2020)

ABSTRACT

This paper will give a general overview of the Scheduler component. The Scheduler is designed to provide autonomous observing capability to the observatory. For such, it is fed with a myriad of telemetry about the state of the observatory (e.g. telescope, dome, instrument state), weather information (e.g. seeing, wind, cloud cover) and so on. The Scheduler also contains a set of base models that provides additional information based on the input telemetry. The information gathered by the Scheduler is then passed over to a scheduling algorithm that, in turn, returns an observing target. The scheduling algorithm itself is not part of the Scheduler, which only specify a set of rules that a an algorithm must follow so it can be used. Here we will describe the telemetry information available to the Scheduler, how that telemetry data is gathered and how it is made available to the scheduling algorithm. The same will also be done for the currently available models. Finally we will define the scheduling algorithm interface and describe how the Scheduler operates in the different modes. Details about the adopted scheduling algorithm will be part of a separate document.

1. INTRODUCTION

Justification for having Scheduler on LSST, reference to requirements and main telescope and site paper.

Introduction to the concept of a component in the LSST Observatory Control System.

Description of the Scheduler component and its role during operations/observations.

2. TELEMETRY

Describes the telemetry available to the scheduler. How does the scheduler gets telemetry data? Where each telemetry is coming from?

2.1. *Time*

Time is one of the most basic and crucial information the Scheduler needs to be able to reliably work. As all high-level software components, the Scheduler runs with time synchronization with the observatory clock.

2.2. *Seeing*

The observatory is equipped with a DIMM that publishes measurements to the observatory middleware and is stored in the EFD. Data from more than one equipment can be available at any single time to the Scheduler. In addition, information about image quality will also be available to Scheduler as data is processed.

Usually we will be interested in more than just the last measurement taken from the DIMM instruments, as time trend analysis is important for the Scheduler to perform predicted scheduling.

After querying the data from the EFD, the Scheduler sorts the data according to a priority rule and passes it to the

2.3. *Cloud cover*

2.4. *Downtime*

2.5. *Observatory State*

2.6. *Observing Queue*

3. MODELS

Describes the general concept of models in the Scheduler framework and how they can be expanded/added. Describe the currently available models.

3.1. *Seeing model*

3.2. *Cloud model*

3.3. *Sky model*

3.4. *Downtime model*

3.5. *Observatory model*

4. SCHEDULING ALGORITHM

Describe the concept of the scheduling algorithm. What are the assumptions made by the scheduler regarding the underlying algorithm, description of the interface.

5. OUTPUT AND OPERATION MODES

Describe the different modes which the Scheduler can be operated and what are the output data that the scheduler generates.

6. CONCLUSIONS

APPENDIX

A. REFERENCES

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B. ACRONYMS

Acronym	Description
DAQ	Data Acquisition System
DIMM	Differential Image Motion Monitor
DM	Data Management
EFD	Engineering and Facility Database
EPO	Education and Public Outreach
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)