OpenSatKit Quick Start
cFS FSW Engineering

V3.0

May 2021

- **Learn cFE**

- **Learn how to develop apps**

OSK Main Screen

CFS_KIT CFS_KIT_SCREEN

OpenSatKit

| Mission FSW | cFS FSW Edu | PiSat | R&D |

System - cfsat Target

Start cFS

Stop cFS

System Time(secs)

1001727

Config System

| Send Config Cmd | About |

OSK Docs & Videos

| Open Resource | About |

Docs & Videos

| Open Resource | About |

core Flight Executive (cFE)

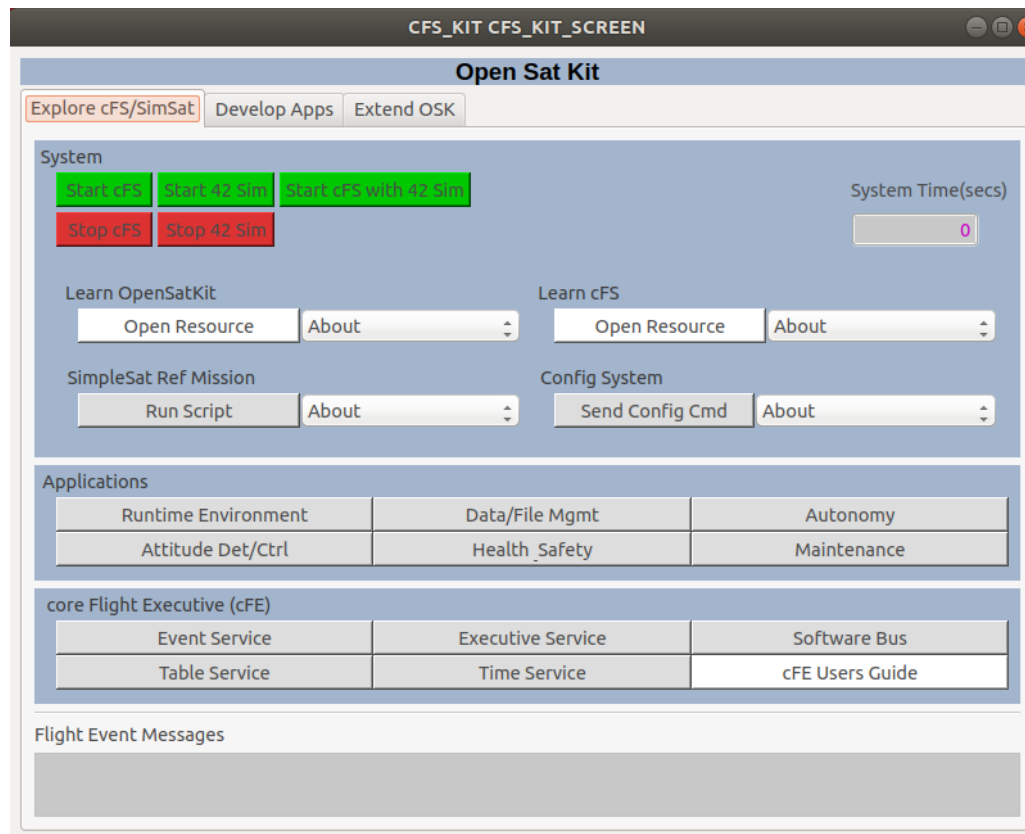| Event Service | Executive Service | Software Bus |
| Table Service | Time Service | cFE Users Guide |

Develop cFS Apps

cFE App Dev Guide	OSK App Dev Guide	
Create App	Dev cFS App	Dev OSK App
Dev ACS App	Dev ECI App	

Flight Event Messages

Telemetry output enabled for IP 127.0.0.1
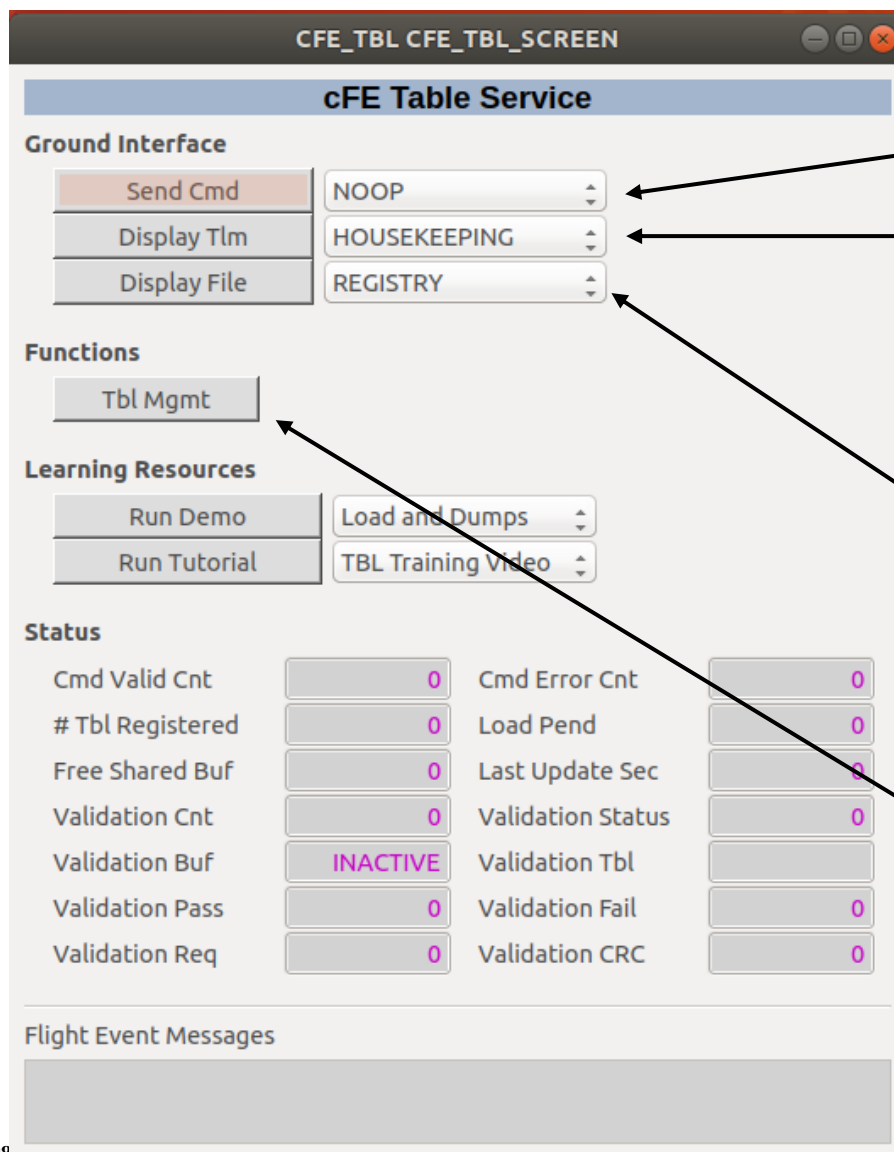
Core Flight Executive (cFE)

- **The cFE has 5 services**
  - **Executive Services (ES):** Manage the embedded software system and create an application runtime environment
  - **Time Services (TIME):** Manage spacecraft time
  - **Event Services (EVS):** Provide a service for sending, filtering, and logging event messages (time stamped text messages).
  - **Software Bus (SB) Services:** Provide an application publish/subscribe messaging service
  - **Table Services (TBL):** Manage application binary file table images

One button/screen for each service

cFE HTML User'sGuide

Table Service screen shown. All cFE screens have the same layout but may not have every component/button

CFE_TBL CFE_TBL_SCREEN

cFE Table Service

Ground Interface

Send Cmd	NOOP
Display Tlm	HOUSEKEEPING
Display File	REGISTRY

Functions

Tbl Mgmt

Learning Resources

| Run Demo | Load and Dumps |
| Run Tutorial | TBL Training Video |

Status

Cmd Valid Cnt	0	Cmd Error Cnt	0
# Tbl Registered	0	Load Pend	0
Free Shared Buf	0	Last Update Sec	0
Validation Cnt	0	Validation Status	0
Validation Buf	INACTIVE	Validation Tbl	
Validation Pass	0	Validation Fail	0
Validation Req	0	Validation CRC	0

Flight Event Messages

Select and send commands

Display a telemetry packet using COSMOS's Packet Viewer.
- Telemetry packets can be generated in response to a command
- E.g. Telemeter the registration information for a single table

Display a binary file using COSMOS's Table Manager
- Binary files can be generated in response to a command.
- E.g. Dump the entire table registry to a file

Display a screen that simplifies user interaction with a service

CFE_TBL CFE_TBL_SCREEN

cFE Table Service

Ground Interface

Send Cmd — NOOP
Display Tlm — HOUSEKEEPING
Display File — REGISTRY

Functions

Tbl Mgmt

Learning Resources

Run Demo — Load and Dumps
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Cmd Valid Cnt	0	Cmd Error Cnt	0
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Flight Event Messages

Select and run a demo
- Demos are a sequence of interactive screens that step the user through a task

Select and run a tutorial
- Tutorial are typically, but not limited to a set of slides coupled with a ruby script for exercises

Each service generates a periodic "housekeeping" telemetry packet every few seconds
- The 'Status' section displays a portion of the housekeeping packet
- The entire packet can be displayed using the <Display Tlm> button in the Ground Interface section

- **ToDo**

  – Performance monitor tool

  – Scripting guide in mission guide

  – Functional screens

Developing Apps

Create App

CFS_KIT MNG_APP_DEV_SCREEN

Manage App Development

```
cfs
|- apps
|    |- example
|- osk_def
|    |- cpu1_cfe_es_startup.scr
|    |- targets.cmake
cosmos
|- config
|    |- targets
|    |    |- EXAMPLE
|    |        |- cmd_tlm
|    |- tools
|    |    |- cmd_tlm_server.txt
|- lib
     |- message_ids.rb


Generated by APPGen

Manually edited by user

Definitions assumed by AppGen
```

1	Create App	Launch tool to create new app/lib from a template
2	Edit cmake	Add app file to cmake target list TGT1_APPLIST
3	Edit ES Startup	Add app to cFE Executive Service startup script
4	Stop cFS/Server	Stop cFS and COSMOS cmd-tlm server
5	Build cFS	Run cmake to build new app
6	Start Server/cFS	Start cFS and COSMOS cmd-tlm server

Run Training Videos   Create 'Hello World' App

Six quick steps to create a "Hello World" created and integrate it into the kit

Create App Templates

Create App Version 1.0

App Template	cFE App Dev Guide	Template Info	Create App

Generate application or library 'hello world' code from a template. Additional artifacts may be generated. See <template info> for details.
Using template directory /mnt/hgfs/OpenSatKit/cosmos/cfs_kit/tools/create-app/templates.

1. Select a template from the drop down menu. Click <Template Info> to get a description of the template.
2. Modify the cFS and COSMOS target directories below. Not necessary with default OSK configuration.
3. Click <Create App> to generate the code.

cFS Target Directory	Show Default	Browse

COSMOS Target Directory	Show Default	Browse