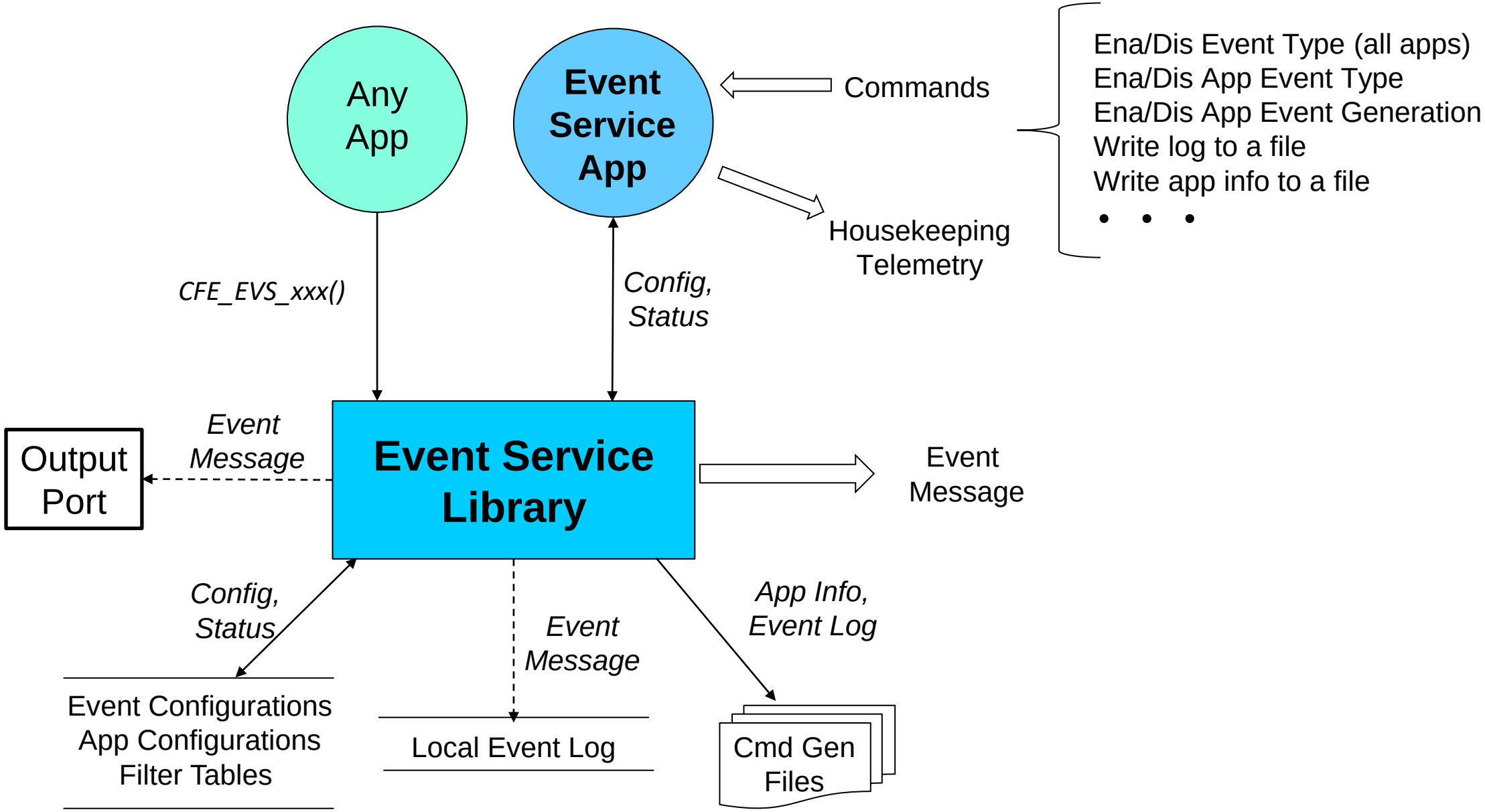
cFE
Event Service (EVS)
Tutorial

OSK v3.1

Overview

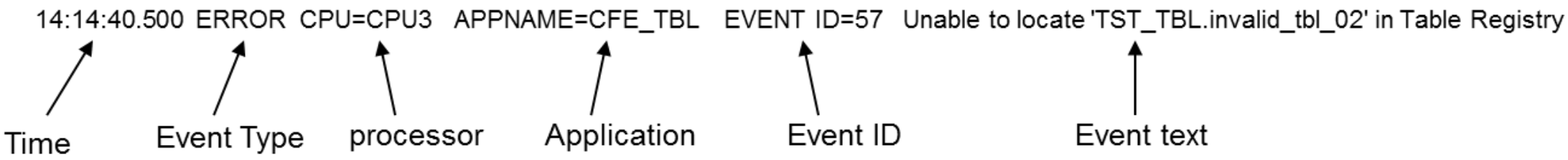
- **Provides an interface for sending time-stamped text messages on the software bus**
  - Considered asynchronous because they are not part of telemetry periodically generated by an application
  - Processor unique identifier
  - Optionally logged to a local event log
  - Optionally output to a hardware port
- **Four event types defined**
  - Debug, Informational, Error, Critical
- **Event message control**
  - Apps can filter individual messages based on identifier
  - Enable/disable event types at the processor and application scope

Event Service Context



Event Message Format

Event message example:



- **Spacecraft time via CFE_TIME_GetTime()**
- **Spacecraft ID (not shown) defined in cfe_mission_cfg.h**
- **Processor ID defined in cfe_platform_cfg.h**
- **Event ID is unique within an application**
- **Event Text is created using printf() format options**
- **“Short Format” platform option allows messages to be sent without text portion**

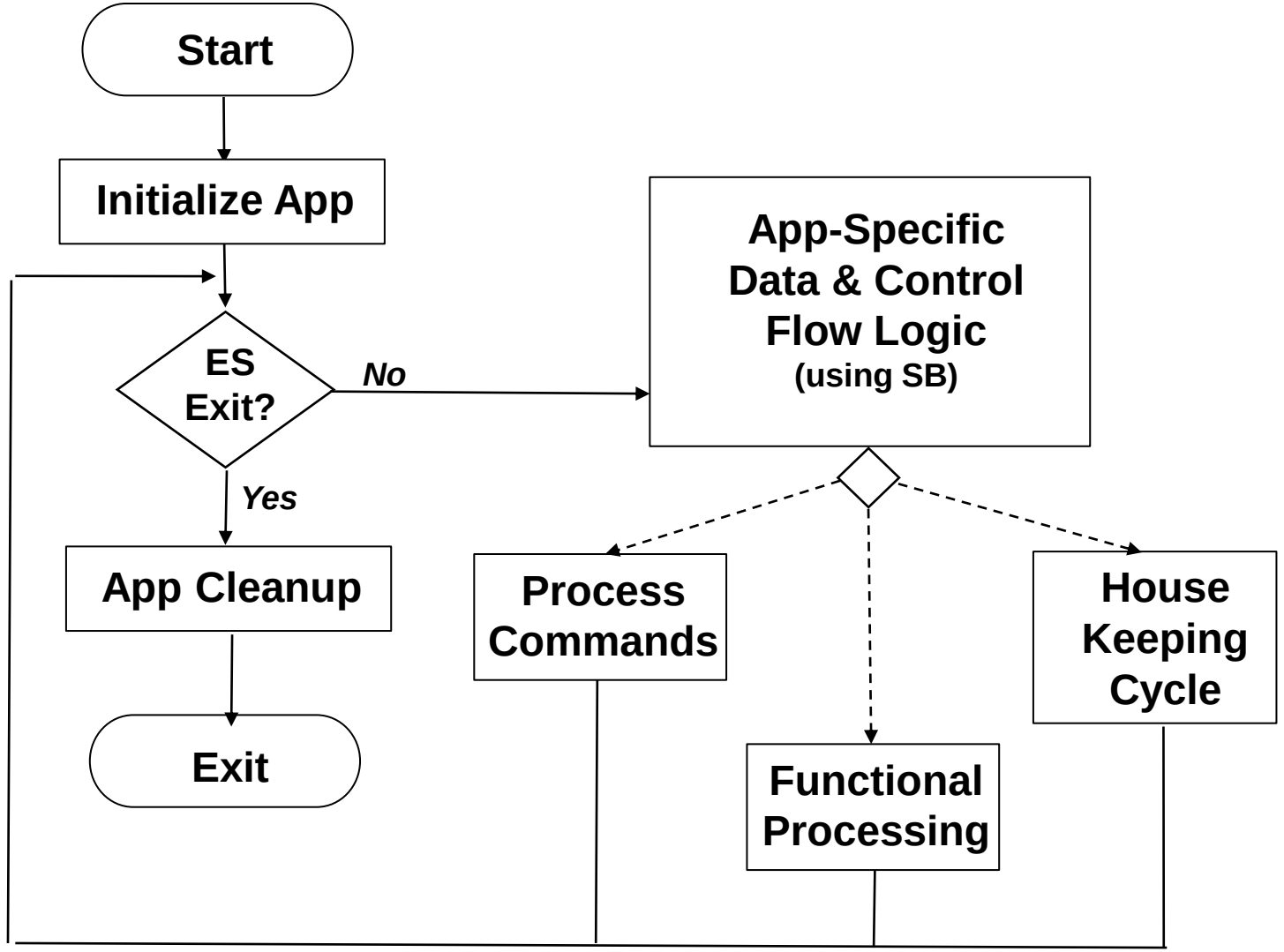
Event Filtering

- **“Filter Mask”**
  - Bit-wise Boolean AND performed on event ID message counter, if result is zero then the event is sent
  - Mask applied before the sent counter is incremented
  - 0x0000 => Every message sent
  - 0x0003 => Every 4th message sent
  - 0xFFFE => Only first two messages sent
- **Reset filter**
  - Filters can be reset from an application or by command
- **Event filtering example**
  - Software Bus ‘No Subscriber’ event message, Event ID 14
    - See *cfe_platform_cfg.h* CFE_SB_FILTERED_EVENT1
  - Default configuration is to only send the first 4 events
    - Filter Mask = 0xFFFC
- **CFE_EVS_MAX_FILTER_COUNT (cfe_evs_task.h) defines maximum count for a filtered event ID**
  - Once reached event becomes locked
  - Prevents erratic filtering behavior with counter rollover
  - Ground can unlock filter by resetting or deleting the filter

Event Message Control

- **Processor scope**
  - Enable/disable event messages based on type
    - Debug, Information, Error, Critical
- **Application scope**
  - Enable/disable all events
  - Enable/disable based on type
- **Event message scope**
  - During initialization apps can register events for filtering for up to CFE_EVS_MAX_EVENT_FILTERS defined in *cfe_platform_cfg.h*
  - Ops can add/remove events from an app's filter

Application Event Service Usage



- **Initialize App**
  - **CFE_EVS_Register()**
    - Optional filter parameter
- **Command/Functional Processing**
  - **CFE_EVS_SendEvent()** as needed
- **Housekeeping Cycle**
  - **CFE_EVS_ResetFilter()**
    - Rare and typically use in interface apps where the event situation may be corrected
- **App Cleanup**
  - **CFE_EVS_Unregister()**
    - Recommended but ES does it for an app, so not mandatory

Event Services API

Application Functions	Purpose
CFE_EVS_Register	Register the application with event services. All Applications must register with EVS
CFE_EVS_Unregister	Cleanup internal structures used by the event manager
CFE_EVS_SendEvent	Request to generate a software event. Event message will be generated based on filter settings
CFE_EVS_SendEventWithAppID	Generate a software event as though it came from the specified cFE Application
CFE_EVS_SendTimedEvent	Generate a software event with a specific time tag
CFE_EVS_ResetFilter	Resets the calling application's event filter for a single event ID
CFE_EVS_ResetAllFilters	Resets all of the calling application's event filters

System Considerations

- **Applications should register with EVS immediately after ES app registration to allows events to be used rather than syslog writes for noteworthy events**

- **Local event log**
  - Suitable for multi-processor architectures
  - Serves as backup to onboard-recorder during initialization or error scenarios
  - Preserved across a processor reset

- **Event message guidelines**
  - Don’t desensitize operators with too many events
    - Be judicious and consistent with when informational events are used
    - Consider whether routine telemetry is a better option for certain state knowledge
  - Balance testing and operational needs
    - Is the event a convenience for testing or does it help operations?
  - Be cognizant that other apps can monitor events and take corrective action based on events

Reset Behavior

- **Power-on Reset**
  - No data preserved
  - Application initialization routines register with the service
  - If configured local event log enabled

- **Processor Reset**
  - If configured with an event log, preserves
    - Messages
    - Mode: Discard or Overwrite
    - Log Full and Overflow status

Retrieving Onboard State

- **Housekeeping Telemetry**
  - Log Enabled, Overflow, Full, Enabled
  - For each App: AppID, Events Sent Count, Enabled

- **Write application data to file. For each app**
  - Active flag – Are events enabled
  - Event Count
  - For each filtered event
    - Event ID
    - Filter Mask
    - Event Count – Number of times Event ID has been issued

- **Local event log**
  - If enabled events are written to a local buffer
  - Log “mode” can be set to over write or discard
  - Serves as backup to onboard-recorder during initialization or error scenarios
  - Suitable for multi-processor architectures
  - Command to write log to file

Configuration Parameters

Parameter	Purpose	Scope	Notes
CFE_EVS_LOG_ON	cFE core platform message IDs	Platform	Defines the message IDs the cFE core will use on that Platform(CPU)
CFE_EVS_LOG_MAX	OSAL platform configuration	Platform	
CFE_EVS_DEFAULT_LOG_MODE	cFE core platform configuration	Platform	Most cFE parameters are here
XX_platform_cfg.h	Application platform wide configuration	Platform	
CFE_EVS_DEFAULT_TYPE_FLAG	Application message IDs	Platform	
CFE_EVS_MAX_EVENT_FILTERS	Define Maximum Number of Event Filters per Application	Platform	