

CORE FLIGHT SOFTWARE



VERSION DESCRIPTION DOCUMENT

PLATFORM SUPPORT PACKAGE (PSP)

BUILD: 1.3.0.0

MAY 24, 2016

SIGNATURES

Submitted by:

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Approved by:

Changed 7 weeks ago by jphickey

X **I approve**

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SIGNATURES – CONTINUED

Approved by:

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This version looks good.
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Scott Tashakkor/MSFC-ES52
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Approving on behalf of Chris Monaco
Approval received via email posted above

Chris Monaco/JHU-APL
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1.0 FSW VERSION DESCRIPTION

1.1 PURPOSE AND SUMMARY

The purpose of this build is to continue to refine and enhance the core Flight System (cFS) Platform Support Package (PSP) library. This build provides various bug fixes, as well as, new features and enhancements including:

- Class A safety-critical instantiation of the library package for the SPARC LEON3 processor
- Instantiation for a PC-RTEMS environment
- Instantiation for the Aitech SP0 3U CompactPCI PPC-VxWorks6.9 environment
- Enhanced cmake build system (in addition to classic build)
- 64-bit Processor Support

This build also cleans out obsolete PSP implementations that had not been maintained in past releases (see ticket #59 for details).

There were some minor API changes to this build that may result in compiler warnings with applications/tasks built via previous PSP releases. These API changes were made to correct and improve the function input parameter types. The changes include:

1. All memory functions accept memory addresses of type ‘cpuaddr’ instead of ‘uint32’
2. All name arguments are now ‘const char*’ instead of ‘char*’ for all API calls

This version of the cFE_PSP is compatible with the latest versions of the OS Abstraction Layer (OSAL) versions 4.2.0 or later and cFE versions 6.5.0 or later. It is highly recommended to use this version of the cFE_PSP with the latest versions of the OSAL and cFE. This version of the cFE_PSP is not backward compatible with earlier versions of the OSAL and cFE components.

There are some outstanding issues being investigated. Resolutions to these issues will require a new release. The project CCB and community inputs will determine which Trac tickets to include in the next release.

This document serves to formally release cFE_PSP Build 1.3.0.0.

1.2 NEW/CHANGED FUNCTIONALITY IN THIS VERSION

Table 1.2-1 identifies new PSP functionality that has been implemented and is integrated into this version.

Table 1.2-1 – New Functionality in this Version

No.	Trac Ticket #	High Level Description of Functionality	Component	Type	Priority
1	#1	Enhanced build system for cFS. The alternate build system uses CMake and offers several enhancements: <ul style="list-style-type: none"> - Completely isolated build tree - No mixing of source files and generated files - Dynamic application search path, supports "app-store" concept by keeping app repos separate from cFS repos. - Supports multiple different build configurations from the same source tree - Includes mechanisms for electronic data sheets (data dictionary) support and Lua functional testing support in the future 	build	enhancement	major
2	#9	Added pc-rtems PSP for running the cFS on standard PC hardware using the RTEMS OS. This package is targeted at debugging or proof-of-concept validation using QEMU as an emulator to provide a virtual PC hardware.	other	enhancement	major
3	#28	Added SP0 PSP for running the cFS in an Aitech SP0 3U CompactPCI PPC-VxWorks6.9 environment	unspecified	enhancement	major
4	#49	New Volume Table macro to prevent need for direct modification to private volume table source code	pc-linux	defect	major

Table 1.2-2 identifies changes to PSP functionality and bug fixes from previously delivered versions and the Trac tickets associated with these changes.

Table 1.2-2 – Changes to Previously Delivered Functionality

No.	Trac Ticket #	High Level Description of Functionality/Bug Report	Component	Type	Priority
1	#3	PSP modular build enhancements	shared	enhancement	major
2	#5	Fix all PSP Memory functions that use a uint32 for memory addresses	shared	defect	major
3	#6	Remove references to "cfe_platform_cfg.h" from PSP	other	defect	major
4	#15	PSP modifications for const-correct CFE API	build	defect	major
5	#17	Clean up "-D" compile time macros used in pc-linux build	pc-linux	defect	major
6	#19	Fix inclusion of PSP internal headers from within public headers	build	defect	minor
7	#21	Fix pc-linux PSP for the latest OSAL	pc-linux	defect	minor
8	#22	Small Fixes pc-rtems BSP	pc-rtems	defect	minor
9	#34	CFE_PSP_MemRangeSet() description error. CFE_PSP_MemRangeSet() function defined in cfe_psp_memrange.c has a comment error on the MemoryType argument that could be misleading. Comments were updated to clearly indicate that any valid CFE_PSP_MEM_ enumeration can be used for the cfe_psp_memrange.c functions.	shared	defect	trivial
10	#49	Volume Table Requires User Modification	pc-linux	defect	major
11	#52	PSP build fails for GRUT699	unspecified	defect	major
12	#48	Allow C99 code in PSP	build	defect	major
13	#54	Class A safety-critical updates to the GRUT699 PSP: <ul style="list-style-type: none"> Updated all ut699 PSP source files to comply with "most" MISRA rules and cppcheck static analysis errors Updated all ut699 PSP source files to remove compiler warnings 	other	task	major
14	#57	PSP build fails for MCP750	mcp750-vxworks6.4	defect	major
15	#58	printf format codes vs. argument types	grut699-vxworks6	defect	minor
16	#59	Remove obsolete PSPs. The following PSPs have not been maintained and will be removed: <ul style="list-style-type: none"> mac-osx mcf5235-rtems pc-cygwin <p>Note: The obsolete PSP implementations listed above are available in older releases and in the babelfish git repository archives. With the changes made to this release (PSP version 1.3), it is recommended to use the maintained PSPs delivered in this release as a starting point vs. using the retired PSPs from older releases.</p>	unspecified	task	major
17	#61	MCP750-VxWorks Memory Variables Should be "cpuaddr" Type	mcp750-vxworks6.4	defect	major
18	#63	PC_RTEMS fixes from psp-1.3/cfe-6.5 testing	pc-rtems	defect	major

1.3 MISSING PLANNED FEATURES AND KNOWN PROBLEMS

Table 1.3-1 identifies functions and known discrepancies that are absent from this release.

Information on currently open Trac tickets is available at https://babelfish.arc.nasa.gov/trac/cfs_psp. Note that this is a restricted website that requires a server account. Additional Trac tickets may have been submitted after preparation of this VDD. A PSP Trac ticket report containing a listing of open tickets is available on request for customers who do not have access to the babelfish server. Please contact Susanne Strege, susie.strege@nasa.gov.

Table 1.3-1 – Functions absent from this Release

No.	Trac Ticket #	Description	Component	Status	Planned Delivery	Type	Priority
1	#4	Clean up shared EEPROM read/write implementation	shared	new	Not Determined	enhancement	major
2	#7	PSP memory, port, and EEPROM functions assume direct-mapped access	other	review	Not Determined	defect	major
3	#8	PSP needs unit tests	tests	closed	Not Determined	defect	major
4	#10	Add PSP unit tests	other	assigned	Not Determined	enhancement	major
5	#11	provide grut699-vxworks6 PSP updates	grut699-vxworks6	new	Not Determined	defect	major
6	#12	consider adding PSPs developed at JSC	other	new	Not Determined	enhancement	minor
7	#14	Implement Bamboo builds of cFS PSP tree	bamboo	new	Not Determined	task	major
8	#18	Add Xenomai BBB PSP	xenomai	new	Not Determined	enhancement	minor
9	#20	Enforce Strict ASCII	other	new	Not Determined	defect	minor
10	#23	Race condition: PSP timer callbacks are set up and started before CFE_TIME is running	other	work_complete	Not Determined	defect	major
11	#24	PSP startup code should confirm that OS_API_Init worked	other	new	Not Determined	defect	minor
12	#26	Update "beaglebone-linux" PSP. This PSP does not yet have the following updates to bring it up to match the development versions of the other PSPs: <ul style="list-style-type: none"> - enhanced build script - change uint32 to cpuaddr - dependency management - compatibility with CFE "const" API - clean up build macros 	other	review	Not Determined	enhancement	minor
13	#27	Fix "utbsp.h" not found failure when building on some platforms	build	closed	Not Determined	defect	major

14	#29	<p>PSP API for onboard devices. PSP needs to define some common API/framework for communication with onboard devices. This would present a consistent API so CFS code can be better abstracted from the hardware implementation details.</p> <p>For instance, if a serial controller device is present on the board, it would speak the same protocol regardless of whether the physical devices is connected over RS232, RS485, an LVDS link, or some other link. However the configuration API and the means to communicate over these different types of interfaces differs. Some boards might have dedicated hardware channels, others might "bit bang" with GPIO, etc.</p> <p>The PSP should abstract this difference and present a similar API so the CFS code that talks to these devices can be portable. The standardization work being performed by the CCSDS SOIS working group may be relevant here as well.</p>	shared	new	Not Determined	enhancement	minor
15	#30	CFE_PSP_MemRead/Write() not checking for NULL pointer args	shared	review	psp_next	defect	major
16	#31	CFE_PSP_MemCpy/Set not checking for NULL pointer args	shared	review	psp_next	defect	major
17	#32	CFE_PSP_MemCpy doesn't handle overlapping ranges	grut699-vxworks6	new	Not Determined	defect	minor
18	#33	Update grut699-vxworks6 cfe_psp_memory.c per white box unit testing results	grut699-vxworks6	new	Not Determined	defect	minor
19	#35	<p>Limit the calculated results in CFE_PSP_WatchdogSet.</p> <p>CFE_PSP_WatchdogSet computes a new value to set the watchdog timer to, but does not limit the results to the specified min and max values (CFE_PSP_WATCHDOG_MIN and CFE_PSP_WATCHDOG_MAX).</p> <p>The calculation is also not protected from overflowing the possible range, so it is possible to get a much different result than expected.</p>	grut699-vxworks6	new	Not Determined	defect	minor
20	#36	Update grut699-vxworks6 cfe_psp_timer.c per white box unit testing results	grut699-vxworks6	new	Not Determined	defect	minor
21	#37	Update grut699-vxworks6 cfe_psp_start.c per white box unit testing results	grut699-vxworks6	new	Not Determined	defect	minor
22	#38	unld PSP core unit test causes a processor exception	unspecified	new	Not Determined	defect	minor
23	#39	Use more accurate return codes	unspecified	new	Not Determined	defect	major
24	#40	change * to ** in cfe_psp_memory.c. For improved efficiency consider changing 1st argument to be a double pointer of type void, and not a single pointer of type void. Then a straight assignment can be used	unspecified	new	Not Determined	defect	major

		in place of memcpy(used to copy 4 bytes). This will be an API change.					
25	#41	SPARC Leon3 memory alignment sensitivity and handling	grut699-vxworks6	new	Not Determined	enhancement	major
26	#42	Simplify Function Pointer Manipulations	other	new	Not Determined	task	major
27	#43	Should PSP have byte-swapping utilities for endian conversions?	unspecified	new	Not Determined	enhancement	minor
28	#44	Rename "mcp750-vxworks6.4" Folder	unspecified	new	Not Determined	defect	major
29	#45	Update mcp750-vxworks6.4 cfeSupport.c to Enforce CF Name	unspecified	new	Not Determined	defect	major
30	#46	Standardize Version Numbering (in PSP)	other	new	Not Determined	defect	major
31	#48	Allow C99 code in PSP	build	new	psp_next	defect	major
32	#50	ApexSim for Arinc653 Posix simulator	other	new	Not Determined	enhancement	minor
33	#51	Trick PSP. There is growing interest in being able to use the Trick OSAL/PSP so that a CFS build can be executed within a Trick simulation basically allowing developers to fly unmodified FSW within an all SW simulation environment on their desktop.	unspecified	new	Not Determined	enhancement	major

2.0 DELIVERED PRODUCTS

Table 2.0-1 identifies the products relevant to this release. The version or date of the release and where the product can be located are also provided. Changes from the previous version are identified.

Table 2.0-1 – Delivered Products and their Locations

Software Element	Changed with this Version?	New Version or Date	Location
Executable for this build	Yes	1.3.0.0	N/A. Executables are not delivered for the cFE-PSP
Installation Procedures & Special Instructions	No	3.0	See CFS Deployment Guide. babelfish.arc.nasa.gov (in git system master cfs_tools branch) and open source at http://sourceforge.net/projects/coreflightexec/
Source Code of this FSW Build	Yes	1.3.0.0	babelfish.arc.nasa.gov (in git system master branch) and open source at http://sourceforge.net/projects/coreflightexec/
FSW Build Plan	N/A		None
Annotated S/W Detailed Design Docs	N/A	5.4	See cFE Application Developer's Guide. babelfish.arc.nasa.gov (in git system master cfs_cfe branch) and open source at http://sourceforge.net/projects/coreflightexec/
Ground System T&C Database	N/A	N/A	None
Ground System Scripts developed by FSB	N/A	N/A	None
Simulator and Test Data Generator Software	N/A	N/A	None
Executable - Ground Tools associated with FSW (tools to build stored command loads, etc.)	N/A	N/A	Tools are available in babelfish.arc.nasa.gov (in git system master cfs_tools branch) and open source at http://sourceforge.net/projects/coreflightexec/
Source Code - Ground Tools associated with FSW (tools to build stored command loads, etc.)	No	N/A	\$WORK Perl scripts to generate ground database and build verification procedures from templates
Unit Test Procedures	N/A	N/A	None. There are no existing unit test procedures.
Unit Test Data	N/A	N/A	None. See note above.
Unit Test Results	N/A	N/A	None. See note above.
FSW Make Files	Yes	Tagged in CM	babelfish.arc.nasa.gov (in git system master cfs_tools branch) and open source at http://sourceforge.net/projects/coreflightexec/

Software Element	Changed with this Version?	New Version or Date	Location
Linker & Compiler Configuration Files	Yes		babelfish.arc.nasa.gov (in git system master cfs_tools branch) and open source at http://sourceforge.net/projects/coreflightexec/

3.0 INSTALLATION PROCEDURES

Table 3.0-1 identifies the nominal Installation Procedure(s) for this release onto the intended target system (including the commercial applications used and the configuration settings). The procedure version identifier, the date of the procedure and where it can be located are also provided.

Table 3.0-1 FSW Installation Procedure(s)

Destination (Target System)	Filename	Version and Date	Location
Procedure is generic for target CPU	CFS Deployment Guide	3.0	babelfish.arc.nasa.gov (in git system master cfs_tools branch) gsfc_build/docs/CFS Deployment Guide.doc and open source at http://sourceforge.net/projects/coreflightexec/

4.0 CONFIGURATION SUMMARY AND VERSION IDENTIFICATION

cFE_PSP Build 1.3.0.0 can be found on babelfish.arc.nasa.gov and is provided as open source on sourceforge.net:

<http://sourceforge.net/projects/coreflightexec/>

PSP version information is documented in the `psp_version.h` source file included in the `/inc` directory under each platform implementation.

5.0 SOFTWARE COPYRIGHT NOTICE

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ACRONYMS

AES.....	Advance Exploration Systems
API.....	Application Program Interface
cFE.....	Core Flight Executive
C&DH.....	Command and Data Handling
cFS.....	Core Flight Software System
CM.....	Configuration Management
COTS.....	Commercial Off-The-Shelf
DCR.....	Discrepancy/Change Request
ES.....	Executive Services
ETU.....	Engineering Test Unit
FSB.....	Flight Software Branch
FSW.....	Flight Software
GSFC.....	Goddard Space Flight Center
JSC.....	Johnson Space Center
I&T.....	Integration & Test
OSAL.....	Operating System Abstraction Layer
POSIX.....	Portable Operating System Interface
PSP.....	Platform Support Package
RTOS.....	Real-Time Operating System
SPARC.....	Scalable Processor Architecture
TBL.....	Table
T&C.....	Telemetry and Command
URL.....	Universal Resource Locator
UTF.....	Unit Test Framework
VDD.....	Version Description Document