Activity: Modify Scheduled Messages

In this activity, we make a minor change to the scheduled messages table to automatically update the temperature every second.

# Bring the BeagleBone up to date

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| 1 | Update the BeagleBone source code from Github. | debian@beaglebone:~/cFS$ git pull  remote: Enumerating objects: 5, done.  remote: Counting objects: 100% (5/5), done.  remote: Compressing objects: 100% (4/4), done.  remote: Total 5 (delta 1), reused 5 (delta 1), pack-reused 0  Unpacking objects: 100% (5/5), done.  From https://github.com/METECS/cFS  eeb48ce..50d80bc metecs\_bootcamp\_2 -> origin/metecs\_bootcamp\_2  \* [new tag] Activity09 -> Activity09  Fetching submodule psp  From https://github.com/metecs/PSP  \* [new branch] Issue1-OSAL\_timer -> origin/Issue1-OSAL\_timer  \* [new branch] is76-usec-conversion -> origin/is76-usec-conversion  + e54cd35...0704c59 master -> origin/master (forced update)  \* [new branch] metecs\_bootcamp -> origin/metecs\_bootcamp  \* [new branch] metecs\_bootcamp\_2 -> origin/metecs\_bootcamp\_2  Updating eeb48ce..50d80bc  Fast-forward  .gitignore | 2 -  Makefile | 159 +++++++  psp | 2 +-  sample\_defs/arch\_build\_custom.cmake | 38 ++  sample\_defs/cpu1\_cfe\_es\_startup.scr | 32 ++  sample\_defs/cpu1\_msgids.h | 102 +++++  sample\_defs/cpu1\_platform\_cfg.h | 2106 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++  sample\_defs/cpu2\_cfe\_es\_startup.scr | 32 ++  sample\_defs/cpu2\_msgids.h | 102 +++++  sample\_defs/cpu2\_platform\_cfg.h | 2106 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++  sample\_defs/default\_osconfig.h | 224 ++++++++++  sample\_defs/global\_build\_options.cmake | 25 ++  sample\_defs/mission\_build\_custom.cmake | 28 ++  sample\_defs/sample\_mission\_cfg.h | 784 +++++++++++++++++++++++++++++++++++  sample\_defs/sample\_perfids.h | 65 +++  sample\_defs/targets.cmake | 100 +++++  sample\_defs/toolchain-arm-cortexa8\_neon-linux-gnueabi.cmake | 35 ++  sample\_defs/toolchain-cpu1.cmake | 25 ++  sample\_defs/toolchain-cpu2.cmake | 37 ++  sample\_defs/toolchain-cpu3.cmake | 25 ++  sample\_defs/toolchain-i686-rtems4.11.cmake | 54 +++  sample\_defs/toolchain-powerpc-440\_softfp-linux-gnu.cmake | 38 ++  sample\_defs/toolchain-ppc-vxworks6.9.cmake | 51 +++  23 files changed, 6169 insertions(+), 3 deletions(-)  create mode 100644 Makefile  create mode 100644 sample\_defs/arch\_build\_custom.cmake  create mode 100644 sample\_defs/cpu1\_cfe\_es\_startup.scr  create mode 100644 sample\_defs/cpu1\_msgids.h  create mode 100644 sample\_defs/cpu1\_platform\_cfg.h  create mode 100644 sample\_defs/cpu2\_cfe\_es\_startup.scr  create mode 100644 sample\_defs/cpu2\_msgids.h  create mode 100644 sample\_defs/cpu2\_platform\_cfg.h  create mode 100644 sample\_defs/default\_osconfig.h  create mode 100644 sample\_defs/global\_build\_options.cmake  create mode 100644 sample\_defs/mission\_build\_custom.cmake  create mode 100644 sample\_defs/sample\_mission\_cfg.h  create mode 100644 sample\_defs/sample\_perfids.h  create mode 100644 sample\_defs/targets.cmake  create mode 100644 sample\_defs/toolchain-arm-cortexa8\_neon-linux-gnueabi.cmake  create mode 100644 sample\_defs/toolchain-cpu1.cmake  create mode 100644 sample\_defs/toolchain-cpu2.cmake  create mode 100644 sample\_defs/toolchain-cpu3.cmake  create mode 100644 sample\_defs/toolchain-i686-rtems4.11.cmake  create mode 100644 sample\_defs/toolchain-powerpc-440\_softfp-linux-gnu.cmake  create mode 100644 sample\_defs/toolchain-ppc-vxworks6.9.cmake |
| 2 | Update the submodules. | debian@beaglebone:~/cFS$ git submodule sync --recursive  Synchronizing submodule url for 'CCDD'  Synchronizing submodule url for 'apps/ci\_lab'  Synchronizing submodule url for 'apps/sample\_app'  Synchronizing submodule url for 'apps/sample\_lib'  Synchronizing submodule url for 'apps/sch\_lab'  Synchronizing submodule url for 'apps/to\_lab'  Synchronizing submodule url for 'cfe'  Synchronizing submodule url for 'osal'  Synchronizing submodule url for 'psp'  Synchronizing submodule url for 'tools/cFS-GroundSystem'  Synchronizing submodule url for 'tools/elf2cfetbl'  Synchronizing submodule url for 'tools/tblCRCTool'  debian@beaglebone:~/cFS$ git submodule update --init --recursive  Submodule path 'psp': checked out '8b767fdae8c674f3e7811f25f4b1e8c39ab35ad8' |
| 3 | Do not build the RTEMS target. | debian@beaglebone:~/cFS/sample\_defs$ git diff targets.cmake  diff --git a/sample\_defs/targets.cmake b/sample\_defs/targets.cmake  index e9f731d..23c69c5 100644  --- a/sample\_defs/targets.cmake  +++ b/sample\_defs/targets.cmake  @@ -90,9 +90,9 @@ SET(TGT1\_FILELIST cfe\_es\_startup.scr)  # CPU2/3 are duplicates of CPU1. These are not built by default anymore but are  # commented out to serve as an example of how one would configure multiple cpus.  -SET(TGT2\_NAME cpu2)  -SET(TGT2\_APPLIST sample\_app sample\_lib ci\_lab to\_lab sch\_lab bcamp\_io\_app bcamp\_mn\_app)  -SET(TGT2\_FILELIST cfe\_es\_startup.scr)  +#SET(TGT2\_NAME cpu2)  +#SET(TGT2\_APPLIST sample\_app sample\_lib ci\_lab to\_lab sch\_lab bcamp\_io\_app bcamp\_mn\_app)  +#SET(TGT2\_FILELIST cfe\_es\_startup.scr)  #SET(TGT3\_NAME cpu3)  #SET(TGT3\_APPLIST sample\_app ci\_lab to\_lab sch\_lab) |

# Automatically Process Temperature

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| 1 | Create a new message id to periodically wakeup the IO app and update the temperature. | debian@beaglebone:~/cFS/apps/bcamp\_io\_app/fsw/platform\_inc$ git diff bcamp\_io\_app\_msgids.h  diff --git a/apps/bcamp\_io\_app/fsw/platform\_inc/bcamp\_io\_app\_msgids.h b/apps/bcamp\_io\_app/fsw/platform\_inc/bcamp\_io\_app\_msgids.h  index a3dcefe..46194c8 100644  --- a/apps/bcamp\_io\_app/fsw/platform\_inc/bcamp\_io\_app\_msgids.h  +++ b/apps/bcamp\_io\_app/fsw/platform\_inc/bcamp\_io\_app\_msgids.h  @@ -3,7 +3,8 @@  #define BCAMP\_IO\_APP\_CMD\_MID 0x1892  #define BCAMP\_IO\_APP\_SEND\_HK\_MID 0x1893  -#define BCAMP\_IO\_APP\_HK\_TLM\_MID 0x0893  -#define BCAMP\_IO\_APP\_TEMP\_DATA\_MID 0x0894  +#define BCAMP\_IO\_APP\_WAKEUP\_MID 0x1894  +#define BCAMP\_IO\_APP\_HK\_TLM\_MID 0x0895  +#define BCAMP\_IO\_APP\_TEMP\_DATA\_MID 0x0896  #endif /\* \_bcamp\_io\_app\_msgids\_h\_ \*/ |
| 2 | Refactor BCAMP\_IO\_ProcessCC to create a separate function to update the temperature. Add the new wakeup message to the processing loop to update the temperature. Subscribe to the wakeup message. | debian@beaglebone:~/cFS/apps/bcamp\_io\_app/fsw/src$ git diff bcamp\_io\_app.c | tee /tmp/t  diff --git a/apps/bcamp\_io\_app/fsw/src/bcamp\_io\_app.c b/apps/bcamp\_io\_app/fsw/src/bcamp\_io\_app.c  index 6aa3146..13a5bc4 100644  --- a/apps/bcamp\_io\_app/fsw/src/bcamp\_io\_app.c  +++ b/apps/bcamp\_io\_app/fsw/src/bcamp\_io\_app.c  @@ -12,6 +12,11 @@  \*/  Bcamp\_IO\_AppData\_t Bcamp\_IO\_AppData;  +/\*  +\*\* static functions  +\*/  +static void BCAMP\_IO\_UpdateTemperature(void);  +  /\* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \*\*/  /\* BCAMP\_IO\_AppMain() -- Application entry point and main process loop \*/  /\* \*/  @@ -206,6 +211,19 @@ int32 BCAMP\_IO\_AppInit( void )  return ( status );  }  + /\*  + \*\* Subscribe to wakeup command packets  + \*/  + status = CFE\_SB\_Subscribe(BCAMP\_IO\_APP\_WAKEUP\_MID,  + Bcamp\_IO\_AppData.BCAMP\_IO\_CommandPipe);  + if (status != CFE\_SUCCESS )  + {  + CFE\_ES\_WriteToSysLog("Bcamp\_IO App: Error Subscribing to Wakeup, RC = 0x%08lX\n",  + (unsigned long)status);  +  + return ( status );  + }  +  CFE\_EVS\_SendEvent (BCAMP\_IO\_STARTUP\_INF\_EID,  CFE\_EVS\_INFORMATION,  "BCAMP\_IO App Initialized. Version %d.%d.%d.%d",  @@ -242,6 +260,10 @@ void BCAMP\_IO\_ProcessCommandPacket( CFE\_SB\_MsgPtr\_t Msg )  BCAMP\_IO\_ReportHousekeeping((CCSDS\_CommandPacket\_t \*)Msg);  break;  + case BCAMP\_IO\_APP\_WAKEUP\_MID:  + BCAMP\_IO\_UpdateTemperature();  + break;  +  default:  CFE\_EVS\_SendEvent(BCAMP\_IO\_INVALID\_MSGID\_ERR\_EID,  CFE\_EVS\_ERROR,  @@ -395,15 +417,14 @@ void BCAMP\_IO\_ResetCounters( const BCAMP\_IO\_ResetCounters\_t \*Msg )  } /\* End of BCAMP\_IO\_ResetCounters() \*/  /\* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \*\*/  -/\* Name: BCAMP\_IO\_ProcessCC \*/  +/\* Name: BCAMP\_IO\_UpdateTemperature \*/  /\* \*/  /\* Purpose: \*/  -/\* This function Process Ground Station Command \*/  +/\* This function updates the temperature \*/  /\* \*/  /\* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \*/  -void BCAMP\_IO\_ProcessCC( const BCAMP\_IO\_Process\_t \*Msg )  +void BCAMP\_IO\_UpdateTemperature()  {  -  Bcamp\_IO\_AppData.iCurTempVal += Bcamp\_IO\_AppData.iDeltaVal;  Bcamp\_IO\_AppData.CmdCounter++;  @@ -411,6 +432,19 @@ void BCAMP\_IO\_ProcessCC( const BCAMP\_IO\_Process\_t \*Msg )  CFE\_SB\_TimeStampMsg((CFE\_SB\_Msg\_t \*) &Bcamp\_IO\_AppData.BCAMP\_IO\_TemperatureDataPkt);  CFE\_SB\_SendMsg((CFE\_SB\_Msg\_t \*) &Bcamp\_IO\_AppData.BCAMP\_IO\_TemperatureDataPkt);  +}  +  +/\* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \*\*/  +/\* Name: BCAMP\_IO\_ProcessCC \*/  +/\* \*/  +/\* Purpose: \*/  +/\* This function Process Ground Station Command \*/  +/\* \*/  +/\* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \* \*/  +void BCAMP\_IO\_ProcessCC( const BCAMP\_IO\_Process\_t \*Msg )  +{  +  + BCAMP\_IO\_UpdateTemperature();  CFE\_EVS\_SendEvent(BCAMP\_IO\_COMMANDPROC\_INF\_EID,  CFE\_EVS\_INFORMATION, |
| 3 | Add the wakeup message to the scheduler table to send every 1 second. | debian@beaglebone:~/cFS/apps/sch\_lab/fsw/src$ git diff sch\_lab\_table.c  diff --git a/fsw/src/sch\_lab\_table.c b/fsw/src/sch\_lab\_table.c  index 508b485..d9d6862 100644  --- a/fsw/src/sch\_lab\_table.c  +++ b/fsw/src/sch\_lab\_table.c  @@ -49,6 +49,8 @@ SCH\_LAB\_ScheduleTable\_t SCH\_TBL\_Structure =  BCAMP\_IO\_APP\_SEND\_HK\_MID,  BCAMP\_MN\_APP\_SEND\_HK\_MID,  + BCAMP\_IO\_APP\_WAKEUP\_MID,  +  SCH\_LAB\_END\_OF\_TABLE  },  { /\*Packet Rate\*/  @@ -64,6 +66,8 @@ SCH\_LAB\_ScheduleTable\_t SCH\_TBL\_Structure =  4, /\*BCAMP\_IO\_APP\*/  4, /\*BCAMP\_MN\_APP\*/  + 1, /\*BCAMP\_IO\_APP\_WAKEUP\_MID\*/  +  0 /\*END OF TABLE\*/  },  {/\*Counter\*/  @@ -79,6 +83,8 @@ SCH\_LAB\_ScheduleTable\_t SCH\_TBL\_Structure =  0, /\*BCAMP\_IO\_APP\*/  0, /\*BCAMP\_MN\_APP\*/  + 0, /\*BCAMP\_IO\_APP\_WAKEUP\_MID\*/  +  0 /\*END OF TABLE\*/  } |
| 4 | Build and run the application. Start the Ground System. Observe the temperature in the telemetry. |  |