

To: Bill Campbell, GOES-R Proving Ground Liaison to the AWIPS II Program

From: Jordan Gerth, Cooperative Institute for Meteorological Satellite Studies

Subject: Code audit and additional questions for Technical Interchange Meeting

Date: 6 May 2011

At the request of Brian Motta, these are the questions which have been prepared for discussion at a Technical Interchange Meeting on the Advanced Weather Interactive Processing System (AWIPS) II during the summer of 2011 to invoke a deeper dialogue about how the software works. Contributions have been arranged according to provider. SPoRT did not respond.

CIRA

From Deb Molenaar: "The machine I am using for awips2 testing finally bit the dust. Am not sure what to order for a replacement; Brian Motta says that current hardware in the field is still not adequate? I am also wondering if they are still running the 32 bit OS but on newer 64 bit hardware? And anything on a specific graphics adapter? Costs vary widely, so I'd hate to spend 2K on an adapter that is not needed..."

CIMSS

- The PluginDataObject decode(byte[]) in the SatelliteDecoder is responsible for writing incoming satellite imagery and products in GINI format with a WMO header to an HDF5 data store. What is the hierarchy above decode(byte[])? Essentially, what packages and classes are responsible for handling new data and signaling a decoder when such data arrives?
- There are a series of sql files located in com.raytheon.edex.plugin.satellite which populate the database with recognizable sectors, positions, creating entities, and sources. How can these files be extended? At what point in the build and/or installation process are the awips.satellite* database created?
- The com.raytheon.edex.plugin.satellite/unit-test/com/raytheon/edex/units/satellite hierarchy contains classes which test the conversion from pixels to amounts. These do not appear to be used any longer. What was the original use for these? The reason I ask is because it appears the pixel to amount (or byte to value) mapping was a logical structure used in AWIPS I which we no longer have in AWIPS II.
- Explain the structure of the satellite-common.xml and satellite-ingest.xml files. What is the proper method of changing or overriding these files? For example, suppose we wanted to increase the size of the thread pool. What is the difference between the corePoolSize and maxPoolSize?
- Explain the structure of the satellitePathKeys.xml file. What are the key and order tags?
- The register() in the SatelliteUnits class is called from initializeFirstFrame(SatelliteRecord) in viz. The primary result is to obtain the data from the data store and then, if necessary, change the units consistent with the units defined in the inventory. Is this right? There is also a spatial class SatMapCoverage which is used by decode(byte[]). In what class is the mapping information (in

Polar Stereographic, Mercator, or Lambert Conformal) retrieved from the inventory for visualization (even if it is changed)? Must all data visualized in a single loop on a single resource be the same projection originally?

- In one case, the LiftedIndexPixelToTempConverter calculates the result and then changes the units from Celsius to Kelvin. How does the UnitConverter work? In what class does the result change back to Celsius prior to display? Why does the LI need to be converted back to Kelvin anyway? A difference performed in Kelvin and degrees Celsius should be exactly the same value/result. There are other examples of this. For example, BlendedTPWToLengthConverter changes millimeters back to meters.
- How are fog product subtractions performed? In com.raytheon.uf.viz.derivparam.python, there are two satellite functions: satDif11u12uIR.py and satDivWVIR.py. Why is there not one for satDif11u3_9uIR? How are these subtractions performed (byte-wise or value-wise) and how are they displayed in units? There are xml files in com.raytheon.uf.viz.derivparam which have a derivedParameter tag and unit attribute but it is not clear beyond that. Evidence suggests that satellite imagery is currently forced to a 0 to 255 scale (8-bit). See lines 245 and 246 of SatResource.java. This is in addition to the 30 MB hard-coded limit in SatelliteDecoder.
- What class is responsible for the behavior of sampling data with the cursor in viz?
- How is viz signaled to update the resource after imagery and products have already been loaded (for example, when new imagery arrives)?
- There are a series of localization xml files within com.raytheon.viz.satellite. What is the structure of these files and how can they be overridden or extended? Where are additional satellite menu xml files placed on the site scale (which directory)? Is there anything else needed to commit that change? What is the localization process and when is it performed?
- Can the displayUnits element in satelliteImageryStyleRules.xml be changed between units properly applied to the same variable with no other changes (for example, to display temperature in Fahrenheit instead of Celsius, changing the C to an F)?
- Is it correct to say that bundles are effectively templates? What is the nature of these files and how do they populate the menus when CAVE is started?
- How can a new viz menu be created? Where do you place xml files and what should they be named?
- What process/class is responsible for purging old data from the data store?

The following is an audit of most of the basic code which handles the satellite ingest and visualization. We are still looking for an end-to-end explanation of how a new satellite image travels through the code from ingest to display. I have broken it into three sections.

```
EDEX - com.raytheon.edex.plugin.satellite
/com.raytheon.edex.plugin.satellite/src
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/SatelliteDecoder.java
com.raytheon.edex.plugin.satellite.dao
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatelliteCreatingEntityDao.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatelliteDao.java
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/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatellitePhysicalElementDao.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatellitePositionDao.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatelliteSectorIdDao.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatelliteSourceDao.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatelliteUnitDao.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/plugin/satellite/dao/SatMapCoverageDao.java
com.raytheon.edex.util.satellite
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/util/satellite/SatelliteCreatingEntity.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/util/satellite/SatellitePhysicalElement.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/util/satellite/SatellitePosition.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/util/satellite/SatelliteSectorId.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/util/satellite/SatelliteSource.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/util/satellite/SatelliteUnit.java
/com.raytheon.edex.plugin.satellite/src/com/raytheon/edex/util/satellite/SatSpatialFactory.java
/com.raytheon.edex.plugin.satellite/utility
/com.raytheon.edex.plugin.satellite/utility/common_static
/com.raytheon.edex.plugin.satellite/utility/common_static/base
/com.raytheon.edex.plugin.satellite/utility/common_static/base/path
/com.raytheon.edex.plugin.satellite/utility/common_static/base/path/satellitePathKeys.xml
/com.raytheon.edex.plugin.satellite/utility/edex_static
/com.raytheon.edex.plugin.satellite/utility/edex_static/base
/com.raytheon.edex.plugin.satellite/utility/edex_static/base/distribution
/com.raytheon.edex.plugin.satellite/utility/edex_static/base/distribution/satellite.xml
/com.raytheon.edex.plugin.satellite/utility/edex_static/base/purge
/com.raytheon.edex.plugin.satellite/utility/edex_static/base/purge/satellitePurgeRules.xml

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Common - com.raytheon.uf.common.dataplugin.satellite

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/com.raytheon.uf.common.dataplugin.satellite/src
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/SatelliteRecord.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/SatMapCoverage.java
com.raytheon.uf.common.dataplugin.satellite.units
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/SatelliteUnits.java
com.raytheon.uf.common.dataplugin.satellite.units.counts
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/counts/DerivedTempToWVPixelConverter.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/counts/DerivedWVPixel.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/counts/DerivedWVPixelToTempConverter.java
com.raytheon.uf.common.dataplugin.satellite.units.generic
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/generic/GenericFromPixelConverter.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/generic/GenericPixel.java

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/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/water/PrecipPixel.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/water/PrecipPixelToLengthConverter.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/water/RainfallPixelToRateConverter.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/water/RainfallRatePixel.java
/com.raytheon.uf.common.dataplugin.satellite/src/com/raytheon/uf/common/dataplugin/satellite/units/water/RainfallRateToPixelConverter.java

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Viz - com.raytheon.viz.satellite

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/com.raytheon.viz.satellite/src
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/Activator.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/SatelliteConstants.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/SatelliteDataCubeAdapter.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/SatelliteProductBrowserDataDefinition.java
com.raytheon.viz.satellite.data.prep
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/data/prepare/SatDataRetriever.java
com.raytheon.viz.satellite.rsc
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/rsc/package-info.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/rsc/SatBestResResourceData.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/rsc/SatBlendedResource.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/rsc/SatBlendedResourceData.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/rsc/SatFileBasedTileSet.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/rsc/SatResource.java
/com.raytheon.viz.satellite/src/com/raytheon/viz/satellite/rsc/SatResourceData.java
/com.raytheon.viz.satellite/localization
/com.raytheon.viz.satellite/localization/bundles
/com.raytheon.viz.satellite/localization/bundles/DefaultCompositeSatellite.xml
/com.raytheon.viz.satellite/localization/bundles/DefaultCONUSSatellite.xml
/com.raytheon.viz.satellite/localization/bundles/DefaultSatellite.xml
/com.raytheon.viz.satellite/localization/bundles/DefaultSatelliteFourPanel.xml
/com.raytheon.viz.satellite/localization/bundles/DerivedCONUSSatellite.xml
/com.raytheon.viz.satellite/localization/bundles/DerivedPOESSatellite.xml
/com.raytheon.viz.satellite/localization/bundles/DerivedSatellite.xml
/com.raytheon.viz.satellite/localization/bundles/HfoGoes.xml
/com.raytheon.viz.satellite/localization/bundles/Satellite3_9WindPlots.xml
/com.raytheon.viz.satellite/localization/bundles/SatelliteLayerPlot.xml
/com.raytheon.viz.satellite/localization/bundles/SatelliteWindPlots.xml
/com.raytheon.viz.satellite/localization/bundles/SatelliteWV7_0WindPlots.xml
/com.raytheon.viz.satellite/localization/bundles/SatelliteWV7_4WindPlots.xml
/com.raytheon.viz.satellite/localization/menus
/com.raytheon.viz.satellite/localization/menus/satellite
/com.raytheon.viz.satellite/localization/menus/satellite/baseDerivedProductPlots.xml
/com.raytheon.viz.satellite/localization/menus/satellite/baseDerivedProductsImagery.xml
/com.raytheon.viz.satellite/localization/menus/satellite/baseFourSatComposite.xml
/com.raytheon.viz.satellite/localization/menus/satellite/baseNHemisphere.xml
/com.raytheon.viz.satellite/localization/menus/satellite/basePOESImagery.xml
/com.raytheon.viz.satellite/localization/menus/satellite/baseSatellite.xml
/com.raytheon.viz.satellite/localization/menus/satellite/baseSounderImagery.xml
/com.raytheon.viz.satellite/localization/menus/satellite/index.xml
/com.raytheon.viz.satellite/localization/styleRules
/com.raytheon.viz.satellite/localization/styleRules/satelliteImageryStyleRules.xml

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Thank you for your consideration.