SNS Control Systems

Software Engineering

“SNS Standards for Building IOC Applications”

Application Development Environment

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OUTLINE FOR FIRST MEETING

- Directory Structure
  - Production
  - Shadow

- Building IOC Applications
  - Templates
  - configuration
  - src
  - Databases
  - Screens
  - iocCommon
  - st.cmd

- Software Release Process

- The Record/Device/Driver Developer

- The IOC Application Developer

- Summary of Standards

- Issues/Concerns
Control Systems Software Standards and Configuration Control.

Production/Operations Server Directory Structure

**Production**

- ADE_TOP=/ade/epics
- SUPTOP=$ADE_TOP/supTop
  - base
    - R3.13.7
    - R3.13.9
    - R3.14.4
  - extensions
    - R3.13.7
    - R3.13.9
    - R3.14.4
  - share
    - R3.13.7
    - R3.13.9
    - R3.14.4
- IOCTOP=$ADE_TOP/iocTop
  - R3.13.7
  - R3.13.9
  - R3.14.4

**Shadow**

- SHADOW=/ade/epics/shadow
- SUPTOP=$SHADOW/supTop
  - base
    - R3.13.7
    - R3.13.9
    - R3.14.4
  - extensions
    - R3.13.7
    - R3.13.9
    - R3.14.4
  - share
    - R3.13.7
    - R3.13.9
    - R3.14.4
- IOCTOP=$SHADOW/iocTop
  - R3.13.7
  - R3.13.9
  - R3.14.4
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Production/Operations Server Directory Structure

- **Production Areas**
  - Configuration Management is under tighter control by the EPICS SysAdmin
  - Software must be RELEASED with explicit CVS RELEASE Tags. (e.g. ether_ip-1-9-1)

- **Shadow Areas**
  - Configuration Management of IOC software and applications is managed by “IOC engineers” and “EPICS sysAdmin”
  - This area is used for initial software releases, and to facilitate bug fixes to a production product.
  - Beta applications can also be initially launched here. (e.g. a new version of EDM or VDCT)
  - Development should not be done here.
    - We have an EPICS development server (i.e. ics-srv02.sns.ornl.gov)
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**Example of Released Software directories**

\[\text{SHARE\_RELEASE} = \$\text{SUPTOP/share/R3.13.9}\]

- \$(\text{SHARE\_RELEASE})/\text{ether\_ip}\)
  - \text{ether\_ip-1-9-1}

- \$(\text{SHARE\_RELEASE})/\text{utility}\)
  - \text{R2-8a}

- \$(\text{SHARE\_RELEASE})/\text{vxStats}\)
  - \text{R1-10-1}

Use release names with syntax following a standard convention:

RI-J-K or <cvsModuleName>-I-J-K

- I = Major release number (major software change was made or hardware changes occurred)
- J = Minor release number (minor software changes or feature additions)
- K = Software patch sequence number
Preparing to Build IOC Applications

When IOC is ready for installation at the site:

- IOC engineer gives the computer system administrator (CSA) the IOC Name.
- `<iocName>` has been standardized to always be the DNS network name of the IOC.
- The CSA creates the `<iocName>` directory in the iocCommon directory and assigns the proper file permissions.
- The CSA creates the `<iocName>/var` directory and assigns the proper file permissions.

`vxuser` will have write permission in

```
$IOCS / <iocName> / var
```
When IOC is ready for installation at the site:

- The CSA creates the appropriate entries in the NFS exports file. This allows the new <iocName> to mount the following “required” directories on the EPICS File/Boot server:
  - Mounts – “/ade/epics/supTop/share”
  - Mounts – “/ade/epics/Shadow/supTop/share”
  - Mounts – “/ade/epics/iocTop”
  - Mounts – “/ade/epics/Shadow/iocTop”
  - Mounts – “/ade/epics/iocCommon”

- The CSA creates an entry in “/home/vxuser/.rhosts” file for each <iocName> on the EPICS File/Boot server
  - All IOCs use rsh to load the vxWorks kernel; so setting up rsh is important

- The CSA creates an entry in the “/etc/hosts” for each <iocName> file on the EPICS File/Boot server

- The CSA adds an entry on the Domain Name Server (DNS) for each <iocName>
**Control Systems Software Standards and Configuration Control.**

### Preparing to Build IOC Applications

**When IOC is ready for installation at the site:**

- To facilitate remote IOC access via the serial port the CSA will create an entry in the “/dev” file system that links to the serial port driver on the EPICS File/Boot server.
  - `/dev/<iocName>`
  - The following command connects to the IOC’s debug port:
    - `cu -l /dev/<iocName>

- The following keyboard sequence disconnects from the IOC’s debug port:
  - `<tilde> -- <period>`

- To facilitate remote IOC “AC” power cycle via the serial port the CSA will create an entry in “/dev” file system and an entry in the “power list” file on the EPICS File/Boot server.
  - The powerlist file is located in “/usr/bin/rpsdata”
  - The following command power cycles `<iocName>`
    - `powercycle <iocName>`
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Building IOC Applications ---- “Application Templates”

**EPICS BASE R3.13.9**

- **SNS VxWorks support Build Template**
  - Template Name – sns
    - makeBaseApp.pl $TEMPLATE_TOP –t sns <name>
    - makeBaseApp.pl $TEMPLATE_TOP –i –t sns <iocname>
      - Where <name> is the App’s name for example
      - Where <iocname> is the IOC’s SNS network name. Which is derived from the SNS device name found in ORACLE (i.e. JERI)
  - When migrating one from EPICS BASE Release to another always check the templates for changes/additions to Makefiles, RULES, and Perl Scripts. This is where many build problems occur.
    - Suggest a migration script ---- “copyTemplateApp.pl”
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Building IOC Applications ---- “Application Templates”

EPICS BASE R3.14.4

- **SNS driver/device/record support Build Template**
  - Template Name – snsShare
    - makeBaseApp.pl –T $TEMPLATE_TOP –t snsShare <name>
    - makeBaseApp.pl –T $TEMPLATE_TOP –i –t snsVx <iocname>
      - Where <name> is the driverApp’s name for example
      - Where <iocname> is the IOC’s SNS network name for example

- **SNS softIOC support Build Template**
  - Template Name – snsSoft
    - makeBaseApp.pl –T $TEMPLATE_TOP –t snsSoft <name>
    - makeBaseApp.pl –T $TEMPLATE_TOP –t snsSoft <iocname>_<port>
      - Where <name> is the App’s name for example
      - Where <iocname>_port is the IOC’s name and procServ port.

- **SNS VxWorks support Build Template**
  - Template Name – snsVx
    - makeBaseApp.pl –T $TEMPLATE_TOP –t snsVx <name>
    - makeBaseApp.pl –T $TEMPLATE_TOP –i –t snsVx <iocname>
      - Where <name> is the App’s name for example
      - Where <iocname> is the IOC’s SNS network name for example

- When migrating from one EPICS BASE Release to another always check the templates for changes/additions to Makefiles, RULES, and Perl Scripts. This is where many build problems occur.
  - Suggest a migration script ---- “copyTemplateApp.pl”
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Building IOC Applications --- "configuration"

**EPICS R3.13 build system configuration:**

- `<TOP>/config/`
  - Should contain files from the sns standard template.
    - CVS module: `snsTemplates`
  - When moving between EPICS BASE software Releases be sure to migrate your "config" area to have the appropriate files.
    - Example: Depending on the CVS software Release of `snsTemplates`; `RULES.Db` could be different
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Building IOC Applications ---- “configuration”

EPICS R3.14.4 and higher build system configuration:

- `<TOP>/configure`
  - Should contain files from the sns standard template.
    - CVS module: `snsTemplates`
  - When moving between EPICS BASE software Releases be sure to migrate your “configure” area to have the appropriate files.
    - Example: Depending on the CVS software Release of snsTemplates; `RULES.Db` could be different
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Building IOC Applications ---- “configuration”

- For R3.13.7 and greater
  - <TOP>/config/RELEASE
    - This file must be used to reference/include external software components or modules
      - header files
      - Database definition files (i.e. *.dbd files)
      - Libraries and executables (e.g. *.o, and *Lib)
      - Databases and Templates (i.e. *.db and *.template files)
  - <TOP>/config/CONFIG
    - Specify target builds for IOC

- For R3.14.4 and R3.14.5
  - <TOP>/configure/RELEASE
    - This file must be used to reference/include external software components or modules
      - header files
      - Database definition files (i.e. *.dbd files)
      - Databases and Templates (i.e. *.db and *.template files)
  - <TOP>/configure/CONFIG
    - Specify target builds for IOC
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**Building IOC Applications ---- “The source (src)”**

- Under R3.13.9
  - `<TOP>/<xxx>App/src`
  - `<xxx>Include.dbd`
    - List all of the database definitions required by your App
  - `Makefile.Host`
    - `DBDEXPAND = <xxx>Included.dbd`
    - `DBDNAME = <xxx>App.dbd`
  - `baseLIBOBJS`
    - Reference objects required by your App.
    - De-reference objects not needed by your App
  - `base.dbd`
    - Reference definitions required by your App.
    - De-reference definitions not needed by your App
  - Note: `baseLIBOBJS` and `base.dbd` must be in synch
  - `Makefile.Vx`
    - Include `../baseLIBOBJS`
    - `LIBNAME = <xxx>Lib`
    - `BIN_INSTALLS += $(EPICS_BASE_BIN)/iocCore`
    - `BIN_INSTALLS += $(EPICS_BASE_BIN)/seq`
Under R3.14.4

» <TOP>/<xxx>App/src
  – <xxx>Include.dbd
    ● List all of the database definitions required by your App
  – <xxx>Main.cpp
  – Note: baseLIBOBJS and base.dbd have been unbundled from EPICS BASE
  – Makefile

» For more details see the ADE for R3.14
On the page, the text discusses bringing external libraries into the build process of IOC (Instrument Control Office) applications. The document outlines three methods for incorporating external libraries:

1. **Method 1:** Compile into your main IOC App library
   - Add `(YYY_BIN)/<libraryName>` to `LIBOBJS +=`.
   - Include `../baseLIBOBJS`.
   - Set `LIBNAME = xxxLib`.
   - Variables like `YYY_BIN` are derived from the RELEASE file and reference the library location.

2. **Method 2:** Pull from external location to your local bin
   - Add `(YYY_BIN)/<libraryName>` to `BIN_INSTALLS +=`.
   - This will copy the library to `<TOP>/bin/<ARCH>`.
   - `ARCH` is an example, such as `ppc603`.

3. **Method 3:** Do not reference external library as part of the build
   - The IOC can load external libraries during bootup via `<TOP>/iocBoot/ioc<iocName>cdCommands`.
   - Remember, `cdCommands` is a product of the build process and should not be modified manually.
   - If missing something in the `cdCommands` file, check the RELEASE file for the proper reference.
   - The database definition file that accompanies the library should also be referenced during IOC bootup.

The standard for production IOCs is **Method 3**.
Building IOC Applications (vxWorks-based) ---- “The source (src)”
<TOP>/<yourAppName>App/src/Makefile

• Bringing in external libraries into the “R3.14” build process
  » Method 1: (Compile into your main IOC App library)
    – PROD_IOC_vxWorks += xxx
    – DBD += xxx.dbd
    – xxx_LIBS += libraryName
    – xxx_LIBS += $(EPICS_BASE_IOC_LIBS)
      • Where “libraryName” is the name of the external library
      • Where “xxx” is the name of your IOC’s main Library
  » Method 2: (Don’t reference external library as part of the build)
    – The IOC can load external libraries by referencing them via:
      <TOP>/iocBoot/ioc<iocName>cdCommands when booting. Remember “cdCommands” is a product of the build process and must not be modified manually!! If you are missing something in the “cdCommands” file, you have left out the proper reference in your “<TOP>/config/RELEASE” file
      • The database definition file that accompanies the library should be referenced via “cdCommands” during IOC bootup as well.
  » The standard for production IOCs is Method 2
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Building IOC Applications ---- “Databases (Db)”

<TOP>/<yourAppName>App/Db

- Supported EPICS Database design tools
  - vi (text-based editor)
  - Vdct (graphical-based editor)
  - JERI (Oracle-based editor)

- Database Source Files:
  - <xxx>.template
  - <xxx>.substitutions
  - <xxx>.db
  - <xxx>.vdb (VDCT hierarchical database files)
    - The EPICS Build system does not currently support <xxx>.vdb files
  - <xxx>.acs (channel access security rules source file)

- Database Product Files
  - <xxx>.template
  - <xxx>.substitutions
  - <xxx>.db
  - <xxx>.acf (channel access security rules combined with common.acs)

- All database editors will operate on and/or create source files. These source files will then be turned into products via the EPICS make system or the JERI Tool.

- All source files for IOC applications will be under CVS control, especially database source files.
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Building IOC Applications ---- “Databases (Db)”

<TOP>/<yourAppName>App/Db

- **Instantiating and Loading Databases**
  - Under R3.13.9/R3.14.4 and higher
    - R3.13.9 "fully instantiated" databases are legal and preferred:
      - Such as in “<TOP>/xxxApp/Db/Makefile.Host”
        - DB += xxx.db
        - USES_TEMPLATE += <aaa>.template
        - USES_TEMPLATE += <bbb>.template
        - USES_TEMPLATE += <zzz>.template
    - R3.14.4 "fully instantiated" databases are legal and preferred:
      - Such as in “<TOP>/xxxApp/Db/Makefile”
        - DB += xxx.db
        - xxx_TEMPLATE += <aaa>.template
        - xxx_TEMPLATE += <bbb>.template
        - xxx TEMPLATE += <zzz>.template
  - Instantiating databases at IOC boot-time is also legal:
    - Such as in “<TOP>/iocBoot/ioc<iocName>/st.cmd”
      - dbLoadRecords ("some.db", "P=helloWorld")
      - dbLoadTemplate ("some.substitution")

- All databases must be imported and “fully instantiated” into JERI (i.e. Oracle-based editor)
  - There are database importing tools in JERI
  - The database import can also be done as part of the EPICS build process.
  - The responsibility of importing databases into JERI lies with the IOC engineer.

- The standard for production IOCs is to only load “fully instantiated” databases:
  - JERI can now parse the “<TOP>/iocBoot/ioc<iocName>/st.cmd” file to automate the process of initially importing production databases. The same file can be parsed to keep Oracle in synch with the production IOC.
Substitution or calibration files are allowed to live outside of the application’s <TOP>:

- Advantage: Not hindered by the IOC CVS RELEASE process when frequent changes occur to alarm limits, engineering limits, deadbands, etc…
- Substitutions file may reside in ORACLE
- Substitution files may also reside on a subsystem specific area of the server’s file system:
  - Example for MPS
    - /ade/epics/iocCommon/Support/mps/
      - Fully instantiated databases, configuration, and firmware files live here
  - Example for Magnet Power Supplies
    - /ade/epics/iocCommon/Support/magnets
      - Fully instantiated databases, calibration data file, magnet mapping files
- The database, calibration, etc… files are still versioned by CVS but do not have to be part of a “CVS RELEASE”
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**Building IOC Applications ---- “EDM Screens (srcOpi)”**

- Extensible Display Manager (EDM) is the standard tool for building EPICS Operator Interfaces.
- Most EDM Screens will be created as a source files. The EDM source files will live in: `<TOP>/xxxApp/srcOpi`
  - The EPICS build system will install the source screens in the following product directory: `<TOP>/opi`
- As operations gets more involved with screen development and we move more into creating operator screens that span across multiple IOCs, we will begin to de-couple screens from an IOC `<TOP>`.
  - Screens are not loaded by an IOC
  - Some screens change often and productivity can be hindered by the CVS RELEASE process. Versioning will still be done by CVS
- Currently most top/system level EDM screens are created in snsMachine. The screens in snsMachine are constantly undergoing modifications. So, snsMachine will not be CVS Released but will still be versioned with CVS
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Building IOC Applications ---- “EDM Screens”

“/ade/epics/opiCommon”

- opiCommon provides the IOC engineer a mechanism to place a file (<xxx>.opi) which contains the path to the desired EDM screens in a common area. We use “OPI_COMMON” environment variable to contain the path opiCommon area.
  - Each file in opiCommon can be automatically added to the EDM Display path. (i.e. EDMDATAFILES)
    - A task for the Computer System Administrator (CSA)
  - Advantage: changes to screens can be pushed into the EDM display path without waiting for the EPICS sysAdmin
  - Well how does one push the screen path to opiCommon area?
    - cd your <TOP>
    - Modify your RELEASE file to reference snsMachine. This is where the Build RULES reside for handing opiCommon
    - make OPI=yes
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**st.cmd**

All IOCs must start here

```
/ade/epics/iocCommon
```

iocCommon

- `errLogs` (all ioc error logs)
- `Readme.txt`
- IOC directories
- `common.<server>.cmd` (settings common to all IOCs)
- `README.common.cmd` (explains `common.<server>.cmd`)

Initially contains only the `var` directory.

After make ST=`st.cmd`, the contents are:

- `vxWorks link`
- `startup.cmd`
- `setup.rc` *(used by ORACLE)*
- `log` *(used by ORACLE)*
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**IOC Boot Process**

- **startup.cmd** – executes:
  - common.<server>.cmd which is located in “/ade/epics/iocCommon/All” directory.
  - st.cmd which exists in your <TOP>/iocBoot/ioc<iocName> directory in your App area.

- **common.<server>.cmd** – mounts areas of the servers that need to be accessed by each IOC and sets EPICS environment variables.

- **st.cmd** – local start-up command file for the IOC which is run at boot time.
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Standard Sequence for 3.13.9 & 3.14 st.cmd files

- Network Setup
- Load “cdCommands”
  - Contains aliases to the full path and CVS Release of software components.
- Load EPICS kernel
  - Load all libraries needed for your application
  - Load MPS Related Software if needed (here)
  - Initialize hardware and drivers
- Load databases
- Load databases
- Load Channel Access Security files
- Create a file containing a list of PVs loaded on the IOC
- Initialize EPICS Kernel (i.e. run iocInit)
- Post-Processing for autoSaveRestore
- Start Sequence Programs
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Getting “/ade/epics/iocCommon/<iocName>” populated

- cd <TOP> and modify your RELEASE file to reference the CVS Released vxWorks location. If migrating an existing App, be sure to check/follow the snsTemplates.

- cd <TOP>/iocBoot/ioc<iocName> and modify the Makefile in this directory for your system again according to the snsTemplates.
  
  » make ST=st.cmd

- This will populate "/ade/epics/iocCommon/<iocName>" with the proper files.

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*st.cmd*

- For an example of st.cmd for 3.14.4 go to
  `/ade/epics/supTop/share/R3.14.4/snsTemplates/R2-3/makeBaseApp/top/snsVxBoot/ioc/st.cmd@vxWorks`

- For an example of st.cmd for 3.13.9 go to
  `/ade/epics/supTop/share/R3.13.9/snsTemplates/R1-4/makeBaseApp/top/snsBoot/ioc/st.cmd`
To Release or Not to Release

- **Scope** – This criteria applies to QA Level 2 & 3 systems. It does not apply to QA Level 1 systems (PPS, TPS, NFSS, Fire Alarm)

- **All EPICS & PLC software initially being placed in the production area (not previously released) must be released prior to the ARR where it will be used**

- **Any changes to previously released software:**
  - Affecting the form, fit, or function of MPS or any other level 2 system
  - Affecting interfaces (signals from or to, trips, resets, etc) to other systems (like vacuum sending a trip to LLRF)
  - Due to FSD revisions (or causing FSD revisions)
  - Affecting Operating (not Expert) screens
  - Affecting Summary PV calculations
  - Causing impact on Alarm Handler Summary PV points
  - Causing the IOC Test Plan to be run
  - Affecting Save/Restore/Bumpless Re-boot
  - Resulting from changes in EPICS versions, EDM versions, or Driver software
  - Affecting PV names
Stuff not needing release

- Changes to previously released software that affect
  - Interlock logic not affecting other systems
  - PID loop tuning parameters
  - Alarm limits (if they don’t impact other systems)
  - Expert Screens
  - PLC Forces
  - Archiver files or settings

- When in doubt, Dave Gurd, George, or Mario make the call
Start of Run

End of Run

Testing per Test Plans

Construction & RF Processing

 IOC

IOC

IOC

IOC

Release

Release

Product Area

Tested software for next run

Development Area

New software generated, software updated, revised, fixed etc for upcoming run

Shadow Area

Software changed during run

(Decision made at Operation Mtg if Release is needed)

Development Area

New software generated, software updated, revised, fixed etc for next run

Shadow Area

Software to be tested and used for next run

Shadow Area

Software being fixed for punch list

IOC on site

IOC

IOC

IOC

IOC off site

Softare Development Life Cycle

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Software Release Process

- **Pre-Release Actions**
  - Prepare a Test Plan for testing all system application software if new, or the software that has changed.
  - Re-vise the FSD if it is impacted and transmit the revision to ProjectWise
  - Use the test plan to test the software as thoroughly as possible in a development environment. (Sign off not needed)
  - Move IOC software from CVS into an appropriate shadow area on the production EPICS file server and build.

- **Release Actions**
  1. Run the IOC Test plan if applicable
  2. Re-Test the software using the test plan and sign off the test plan
  3. Following Test Plan approval, coordinate with operations to test/integrate IOC software during a maintenance window; create a Maintenance and Controls E-log entry as well.
  4. After successful testing (sign off), create a production CVS RELEASE tag with update README and RELEASE_NOTES
  5. Export official CVS RELEASE into production area and coordinate with operations during maintenance window to install new RELEASE.
  6. Create a log entry in the Maintenance and Control Systems Section of the E-log book. Announce new RELEASE via e-mail to EPICS SysAdmin as well.
  7. Send e-mail to George, Mario, CF Operations, CHL Operations?, John Munro, Delphy, John Cleaves, Ron Battle, Jeff Patton, Coles Sibley, and all IOC Engineers stating
     - Brief description of change
     - System, subsystems, and IOCs impacted
     - Impact on Alarm Handler, Archive, or Drivers
  8. EPICS SysAdmin will now “lock” the portion of the software subject to re-release if changed. Essentially the file permissions will be changed to Read-Only.
What constitutes a RELEASE?

- All the source files under a <TOP> that creates a build for an IOC or shared component
- Files that change often can opt not to use RELEASE numbers but must be still versioned under CVS.
  - Database Substitution Files
  - Configuration files generated by an external system such as Oracle.
  - EDM screens that change frequently
EPICS Record/Device/Driver Maintainer’s Responsibility

- Provide “R3.13” and R3.14 drivers following the SNS ADE
  - TestApp demonstrating driver functionality
  - Database Templates and/or EDM screen Templates if needed
  - Provide stand-alone driver libraries and database definition (dbd) files, include files.
  - Library Scheme for R3.14
    - lib<Driver>.a (Static library)
    - <Driver>Lib (dynamic library)
    - <Driver>Lib.munch (dynamic library)
    - <Driver>.dbd (used for registration in C++ also)
- Documentation
  - README
  - RELEASE_NOTES
  - User’s Guide (HTML/PDF)
- Include driver routine to support dbior.
- RELEASE Driver/Device/Record Support according to the “SNS Software RELEASE Standards”
IOC Engineer Responsibilities

- Confirm that IOC is running properly and enter this confirmation in the eLog.
- Confirm and record in eLog that data is being properly archived.
- Create and maintain a Global Archive for your system. Operations can help with configuration.
- Create Archive request files and provide up-to-date request files to the archiver team for installation.
- Create Alarm handler files and provide up-to-date alarm handler files to John Munro for installation.
- Ensure that your system recovers from a reboot. This means deploy autoSaveRestore software if necessary.
- Verify that all pvs from your ioc are connecting on edm screens. Any screens with unconnected pvs should be addressed.
- In the event that an IOC reboot is necessary, obtain permission from Chief Operator and Dave Gurd prior to rebooting.
- Record entry in eLog to document the process immediately following the reboot.
- Accept and honor on-call duty assignments for nights and weekends to help provide operator support when it is needed.
Standards Summary

- All IOCs use iocCommon for the boot process.
  » Use make ST=st.cmd
- All “IOC Apps” and “Share Apps” use the SNS Standard Templates (i.e. cvs module snsTemplates)
- Reference all external libraries (e.g. as the ones in $SHARE) from within your IOC’s st.cmd file. Do not link in external libraries at compile time.
- Create only fully-instantiated databases for the IOC to load via the st.cmd file.
- All IOC should be running the stable version of VxWorks, currently SNS06a
  » Check with EPICS Sys Admin for official Release status of vxWorks
- All IOCs are configured to support Channel Access Security
- All IOCs use at a minimum the following components from $SHARE:
  » timestampRecord
  » vxStats
  » utility
  » autoSaveRestore
- All IOCs follow the st.cmd file according to the snsTemplates
  » No references to softlinks should be in the cdCommands file
  » No NFSMounts except as provided in IOCCommon
- All Control Systems Software is maintained with the SNS versioning system
- All Control System Software production components that are subject to CVS RELEASE Tags follow the SNS RELEASE Process.
  » Other components are separated if not subject to CVS RELEASE Tags
    – Example: databases, screens, configuration files from Oracle, etc…
Issues/Concerns

- We will apply the standards for at least 6 months and then re-evaluate.

- Need to contact CosyLab with concerns on making the hierarchical databases (i.e. xxx.vdb) a part of the EPICS build system.

- Need to get some helpful scripts and tools to help automate more things in the IOC build process.

- There are still IOCs not set-up according to the standard (running under R3.13.5/R3.13.7)

- Goal: The DTL 1-3 run is in March. We need all IOCs set-up according to the SNS standard (running R3.13.9/R3.14.4.)
  - Can we get there ahead of schedule?
  - Can we re-adjust priorities so that IOC standardization and EPICS Base Release migration can’t be preempted by other tasks?