Report

CODAC Core System Version 6.1 Release Notes
This note is a supplementary document for the CODAC Core System (CCS) to provide users with information on the changes introduced with the release of the CCS 6.1.0 version.

<table>
<thead>
<tr>
<th>Approval Process</th>
<th>Name</th>
<th>Action</th>
<th>Affiliation</th>
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<tr>
<td>Author</td>
<td>Lange R.</td>
<td>11 Sep 2019:signed</td>
<td>IO/DG/COO/SCOD/CD/DCS</td>
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<tr>
<td>Co-Authors</td>
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<tr>
<td>Reviewers</td>
<td>Stepanov D.</td>
<td>11 Sep 2019:recommended</td>
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<td>11 Sep 2019:approved</td>
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Document Security: Internal Use
RO: Lange Ralph

Read Access: AD: ITER, AD: External Collaborators, AD: IO_Director-General, AD: EMAB, AD: OBS - Controls Division (CD) - EXT, AD: OBS - Data and Connectivity and Software Section (DCS) - EXT, AD: OBS - Data and Connectivity and Software Section (DCS), AD: Auditors, AD: ITER Management Assessor, project administr...
# Change Log

## CODAC Core System Version 6.1 Release Notes (Y92E73)

<table>
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<th>Version</th>
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<th>Issue Date</th>
<th>Description of Change</th>
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<td>02 Sep 2019</td>
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<td>11 Sep 2019</td>
<td>The change bars do not work in Word as before, so: * Accept all changes * Change the introduction, dropping the change bar remark</td>
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CODAC Core System Version 6.1 Release Notes

This note is a supplementary document for the CODAC Core System (CCS) to provide users with information on the changes introduced with the release of the CCS 6.1.0 version and those added with the CCS 6.1.1 version.

Additions for CCS 6.1.1 are kept in separate, clearly marked paragraphs; new version numbers in tables are underlined.

See warnings in these notes for changes that may have a significant impact on existing I&C applications. Those that are present since previous versions are indicated with a reminder.

This document is complemented with on-line information that is available at the CODAC Core System Community Pages that provides the CCS users with the up-to-date status of:

- The documentation
- The changes introduced in each components (improvements and bug fixes)
- The known issues remaining in the 6.1.0 version
- The roadmap
- The training material - these will be updated for CCS 6.1.0 workshops in April 2019.

The CS-Studio release notes are in a separate document: CODAC Core System Version 6.1 CS-Studio Release Notes (Y86FS7)

**Warning** I&C projects developed with a previous versions of CCS shall be migrated following the instructions available in the CODAC Core System Migration Guide (7JCFUD).

Main changes in CCS 6.1.0

1. PostgreSQL upgrade (v10)
2. Unification of programs and IOC process with better control of those.
3. New syntax of health monitoring variables (SYSM)
4. Stable OPC UA support
5. Fixes of issues in services handling for operational systems
6. PSOS definition less coupled to COS mapping
7. Full support (Linux driver and EPICS Device Support) for NI PXIe-6363 board
8. S7PLC driver supports mbbiDirect/mbboDirect record types
# COMPONENTS UPDATE

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**Reminder**  From version 6.0, NDS has been removed from the CCS distribution and will be distributed separately.
1 Operating System

The RHEL version is RHEL 7.4.

The kernel version is 3.10.0-693:
- 3.10.0-693.2.1 for the default installation
- 3.10.0-693.rt56.617 for the RT enhanced one (MRG-R).

Reminder From CCS 6.0.0: The NTP service daemon ntpd has been replaced by chronyd.
- System V / BSD init system, initd, has been replaced with systemd for services management.
- Linker became stricter with respect to external library references (see Migration Manual for details)

2 EPICS

EPICS 7 is included in the CCS 6.x distributions. It comprises the modules previously versioned as EPICS Base 3.x.x (3.15.5 in CCS 5.4.0) and the pvData/pvAccess modules (aka EPICS V4).

The details for all the EPICS components included in the CCS 6.1 distribution are available in the CCS 6.x EPICS Roadmap: EPICS Related Roadmap for CCS 6.x (UL8KVQ)

The included versions are the following:

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<td>VisualDCT</td>
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(*) the RPMs are not installed as part of a CCS system profile but shall be installed as required, see the CCS 6.x EPICS Roadmap for details.

3 Shared Units

Changes:

- (11076) CCS 6.1 comes with the new major version of PostgreSQL, v10. All database applications have been migrated to this new version. Note that the switch back to CCS
6.0 is not clean (known issue 11505), and will require reboot after switching, before the
6.0 system can be used;
- (10787) CCS 6.1 comes with the new version of Eclipse, v4.7.3 (Oxygen). SDD tools
  as well as CS-Studio ones have been adapted to this version;
- (10511) iter-rhn-* family of commands, like iter-rhn-register, will no longer
  require root shell to operate (sudo is implicitly used);
- (10470) codac-uninstall command now will ask for confirmation. In scripts, use -y
  flag to force non-interactive execution;
- (10654) Similarly to TCN_INTERFACE_NAME and DAN_INTERFACE_NAME, a
  PON_INTERFACE_NAME environment variable is now made available to designate the
  network interface configured for PON connection.

Changes for 6.1.1:
- (11742) Fix of “codac-help --list-topics” command, which did not work as
  documented.

4 Control System Studio (CS-Studio)

Main enhancements:
- Date & Time ISO Format
- New CSS Project Shortcuts
- Message History integrated in the Operator Interface
- PV Write History
- ITER Composite Alarm Root
- Improvement of the PV connection delay when running OPI
- Optimisation of the archive configuration import
- Starting and stopping services generate log messages
- css-dbmanager tool uses the generic codac-dev user
- Electrical Symbols Library Update

Main fixes:
- ISO time format issues fixed on the alarm table and messages history
- Archived sample timestamps were rounded up
- Subclipse usage reporting popup at startup
- Connectors issues

The details are provided in dedicated release notes: CODAC Core System Version 6.1 CS-
Studio Release Notes (Y86FS7).

Changes for 6.1.1:
- (11484) The Java exception is trapped when importing alarm configuration with
  automated action and no delay defined (by default delay = 0 will be assumed);
- (10907) and (11934) Plot axis font issue fixes;
- (11900) PV Write log message indicates now the new value and timestamp instead of
  the old value;
- (11951) PV Write log messages do not track beast datasource changes as they are
  already part of the alarm message history;
- (11942) The alarm pane "PV Write" tab includes the PV Name column;
- (11916) css-dbmanager utility has a new options to ANALYZE and VACUUM tables
  and get statistics INFO.
Temporary Control Room (TCR) scope:

- (11944) Partitioned table tablespace location is now prefixed by the TCR name;
- (11793) Message History Log Database - ID column of message_content can be dropped;
- (11796) Setup of new ETL (Extract, Transform and Load) script for message history;
- (10980) Alarms List OPI did not work with integrated OPI files navigation – fixed;
- (11783) and (11939) ITER Alarm Page and ITER message history had a wrong message history filter – fixed;
- (12021) OPIs Map navigation was broken for 5.4 OPIs – better support of previous versions is provided.

5 Self Description Data Tools

Main changes:

- (10996) EPICS IOCs are now presented as programs, which can be explicitly deployed on controllers. One can thus add or remove IOCs at will. It is, however, recommended to leave the default IOCs intact, in order not to disturb the generation process;
- (11001) Full support for OPC UA communication with PLCs. SDD Editor now allows management of OPC UA sessions and subscriptions of the IOCs concerned. An I&C project global setting was added to select between S7PLCAsyn and OPC-UA PLC interface;
- (11033, 11079) Support for new naming convention for health monitoring. Instead of an automatically assigned controller or cubicle index, it is now necessary to provide an ITER-valid component name to make this function working properly;
- (11083) SDD Editor now allows manual assignment of control unit indexes. If not used, indexes are assigned automatically from 0, as in previous releases. The base number of index counting can be now adjusted in the I&C project properties;
- (10995) Support for user-defined variable attributes. It is now possible to attach arbitrary name-value pairs to variables to store additional user-defined properties. Note that in CCS 6.1 these properties are persisted in Excel export only, but not in sdd.xml (known issue 11688);
- (10997) Initial support for generation of CS-Studio PVTable and PACE configuration. These tools are used at runtime to monitor, and, possibly, modify PV values;
- (10596) The functionality of the sdd-cryo addon, generating additional mapping files for large PLC projects, was integrated in SDD tools. The tool was dropped from the distribution. The new settings are now available in the SDD Editor Preferences window, as well as the sdd-translator options -genmapping, -maxvarudt;
- (11016) Support for mbbiDirect/mbboDirect records in PLCs;
- (11093) Support for 31-bit mask for mbbi/mbbo records on PLC. The previously supported mask was limited to 16 bits;
- (10032) Support for generation of PSOS machine in absence of defined COS-PSOS mapping, which often comes later in the design;
- (10853, 10855) SDN and DAN variable descriptions are now exported by translator, as they contain information valuable for post-processing;
• (8862) MAC address management is no longer considered to be in scope of SDD, so the corresponding fields were removed from the UI;

• (10843) Support creation of non-existing CBS levels from variable names on Excel import. Previously, all such variables were placed under ORPHAN function and had to be manually moved;

• (10794) Support for Excel export/import of DAN variables;

• (10209, 11389, 11569) SDD OPI files generation was aligned with the current practice, to avoid generating mimic canvases and get rid of the remaining hardcoded macros;

• (10406) SDD generated OPIs were improved to pass better the CS-Studio OPI checker. Some warnings may still be manifested. Also, general OPI usability feedback was taken into account (8280);

• (8804) SDD-generated OPIs now allow invocation of record-specific faceplates;

• (9020) Alarm page OPI mimic names were improved to replace the “:” variable name separator with “__” instead of “_”, to avoid possibility of two valid names to collide;

• (10845) sdd-sync will now properly warn about attempts of loading newer project on older CCS systems. Previously, an unclear “Unable to import” message was displayed. Overall error reporting was also improved (10628);

• (11322) sdd-sync-direct (high performance sdd-sync) release v0.12. See changelog in /opt/codac/sdd/sdd-sync-direct/doc/changelog.txt;

• (10713) The hard ceiling of 1GB for memory heap was removed from SDD Editor to facilitate treatment of large I&C projects. It now defaults to the JVM’s default heap size. If that’s not enough, it can be increased, as usual, with the “sdd-editor -vmargs -Xmx” option;

• (10567, 10660, 10702, 10793, 10796, 10944, 11021, 11099, 11102, 11107, 11134) Many usability improvements (but also few new inconveniences – 10575, 11564, 11635 – due to unfinished Eclipse migration);

• (11015) file(1) utility was enhanced to recognize some I&C project files. Example of the outputs before and after:

```bash
CCS-600:~/m-plc-sample> file -z *
pom.xml:    exported SGML document, ASCII text
sdd.xml.gz: XML 1.0 document, ASCII text, with very long lines (gzip compressed data, from FAT filesystem (MS-DOS, OS/2, NT))
src:        directory

CCS-610:~/m-plc-sample> file -z *
pom.xml:    Maven project "plc-sample" version 0.0.0, packaging:
codac 6.1.0, ASCII text
sdd.xml.gz: ITER CODAC SDD IandCProject "plc-sample" version 0 (format 6.1.0), ASCII text (gzip compressed data, from FAT filesystem (MS-DOS, OS/2, NT))
src:        directory
```

Versions of SDD reference data in this release:

• PBS snapshot version 20190204;
• CBS snapshot version 20190204;
• GBS snapshot version 20190204;
- TTT snapshot version 20190205;
- AAAA snapshot version 20160613 (no changes);
- SS snapshot version 20140129 (no changes);
- Units of measure snapshot version 20180130 (no changes);
- Equipment catalog snapshot version 20190205, including:
  o ITER slow controller catalog 333J63 v4.1 (11 Aug 2017);
  o ITER fast controller catalog 345X28 v2.7 (19 Dec 2018).

Changes for 6.1.1:

- (9502, 11647) SDD generation of OPI files was aligned with the latest HMI style guide (3XLESZ v3.9). In particular, mimic pages now retain their _Mimic.opi suffix (like it was in CCS 5.4), and static frame <PVNAME>_Alarm.opi files are no longer produced;
- (11824) Fix to suppress mandatory macro FUNCTION_NAME required in new template instances. The macro was introduced in CCS 6.1 to handle cases where SDD could not automatically attribute a variable to a function (“orphan” variables), but it had an undesirable side effect of affecting valid variables as well;
- (12067) Fix for SDD translation of programs containing DAN structures. Previously, the translator produced a non-compilable structure initialization code;
- (11667) Fix for the default PLC device support in the project to be always S7PLCASyn. Previously, on project creation, it could be arbitrarily set to S7PLCASyn or OPC UA;
- (12005) Fix for incorrect EPICS DTYP field of non-PLC variables present in an OPC UA project. Previously, such variables were incorrectly forced to have OPC UA device support;
- (11931) Fix for duplicate declaration of OPC UA sessions and subscriptions in userPreDriverConfig.cmd file. Previously, when the project was translated with an “update” option, such declarations were building up;
- (11936) Fix for an incorrect SCAN field of OPC UA variables other than “ao” and “bo”. Previously, SDD would unconditionally force “I/O Intr” scanning in such cases. With the fix, the SCAN field is only preset to “I/O Intr” for variables associated with OPC UA subscription, with possibility for a user to alter the SCAN value;
- (12002) Fix for EPICS INF/OUT fields being limited to 80 characters max. OPC UA resource references often result in long strings to be put in these fields, so this limit was removed;
- (11961) Fix for SDD-generated PLC monitoring screens. Previously, they were not fully aligned with the SYSM naming convention change happened in CCS 6.1, which has led to some monitoring parameters appearing disconnected on the screen;
- (11962) Fix for an EPICS SIML field pointing to a non-existing variable. The name of the SIML toggle variable was changed in CCS 6.1 due to SYSM naming convention change. The configuration generated before the fix rendered the PLC simulation mode unusable;
- (11630) Fix for redundant PLC properties in sdd.xml. Previously, the attribute indicating that a PLC is redundant, might have been lost on project reload;
- (11883) Fix for POC attribute of a controller being lost on SDD translation. Previously, such translated project would not recreate a POC controller on project reload. Note that it affected SDD translator only; XML projects exported directly from the SDD Editor were not affected;
• (12020) Fix for sdd-sync-direct not correctly initializing PON archiving flags for non-PON variables. Previously, this prevented generation of configuration files from projects loaded with sdd-sync-direct.

Reminder The SDD web application has been removed from the CCS distribution from version 6.0.0. Use SDD Editor for local development. Central web application can be consulted at https://sdd.iter.org.

6 Maven Tools

Changes:
• (10720) Maven Editor was aligned with mvn command line to allow operating on non-SDD projects. Previously, an error message “Bad unit location or unit doesn't have sdd.xml or sdd.xml.gz file!” was displayed on project import attempt;
• (11000) Similarly to SDD Editor, it is now possible to do “Save as New” in Maven Editor. It allows cloning projects seamlessly for further modification;
• (10463) Similarly to dbl command, the results of dbla command (list database aliases) will now be stored on disk during the IOC startup. Existing projects will have to be regenerated to benefit from this feature;
• (11100) ITER Maven plugin was enhanced to support C/C++ code coverage out of the box. To produce lcov coverage report, run “mvn clean test -Dcoverage”;
• (11230) “mvn sonar” command was enhanced to support SonarQube project components. Previously, for multi-module software units, one Sonar project was produced per each module.

Changes for 6.1.1:
• (11849, 11857) Fix for a number of CCS 5.4 to 6.1 migration issues with OPI navigation. Previously, navigation from a mimic to another mimic in the same workspace could have been migrated incorrectly. Relative paths in navigation files were not correctly migrated as well;
• (11853) Fix for migration of mimics referring to symbol libraries embedded in the project. Previously, when mimics were moved to a “mimics” folder, the references to the library were not recreated under the same folder, which has led to broken references in mimics;
• (11718) Fix for removal of old (pre-6.0) S7PLC device support references from EPICS makefiles. Previously, the remaining references to the old driver DBD and library could cause a compilation failure after project migration;
• (12077) Fix for broken “Version Control -> Retrofit” command in Maven Editor. Previously, Maven Editor was not built correctly, which resulted in exception when trying to use this feature.

7 Health Monitoring

Changes:
• Synthesis health status of PCF, PSH, Cubicle and other components.
• New naming convention for including the component name in the PV name.
• Added dedicated process monitoring for PCF and PSH (VAR: PS)
• Added process monitoring option: The user can select process monitoring option (R: Must Run, S: Must stop, O: optional)
• (10559) CPU load is correctly calculated now.
Changes for 6.1.1:

- (11922) Bad macros in iocmon template/subs with PLCs – fixed.

**Warning** The PV names convention has changed. The names of the PVs linked with components are now built from the component name instead of a component type and index.

For a component named $(PPPPPP)-$(TTT)-$(NNNN)$, the PV are named as: $(CBS)-SYSM-$(PPPP)-$(PP):$(TTT)$(NNNN)-[CCCC]-VAR instead of: $(CBS)-SYSM$:$(X)$(nnn)[CCCC]-VAR

8 PLC Driver

Changes:

- SPSS v3.5 for S7-300/400
- SPSS v1.1 for S7-1500
- Addition of mbbiDirect & mbboDirect record types
- mbbi and mbbi records support 32 bits integers in PLC.

Changes for 6.1.1:

- (11822) S7 PLC template record bug introduced in CODAC Core 6.1.0 has been fixed. It now shows the PLC status in SDD generated HMI correctly.

**Note** Some issues have been fixed for redundant configurations but some conditions, such as the lost of time reference, need additional actions to be taken. Users of redundant PLC setups should contact codac-support for details.

9 TCN Support

New feature:

- Development of a TCN agent service collecting TCN-related information on every host and making it available as EPICSv7 (pvData/pvAccess) structured record to facilitate health assessment, human-friendly monitoring.

Changes for 6.1.1:

- (12069) The routine used to get process id by name was made re-entrant to ensure safe operation in the multi-threaded implementation of the TCN Agent.

**Reminder** The support for the legacy NI PXI 6682 board is stopped from CCS 6.0 and the ptpd-nisync daemon has been removed from the distribution.

10 SDN Support

New features:

- Introduction of an AsynchronousSubscriber class in SDN core library to facilitate support for callback-style programming.
- Development of a SDN2PON gateway to expose SDN topics in the form of EPICSv7 (pvData/pvAccess) structured record natively supported in CS-Studio, e.g. extend monitoring widgets in BOY to display SDN-related variables and data.
**Reminder**  
Interoperability across little/big endian platforms introduced in 6.0.0 with some limitations.  
Check [CODAC Core System Version 6.0 Release Notes (VQYPWG)](#) for details.

## 11 DAN Support

New features:
- Addition of metrics (number of lost samples at streamer and archiver level)
- Bug fixes

Changes for 6.1.1:
- (11977) DAN streamer should make sure that the signals INT,TERM and ALRM are not masked: was not working correctly when used within EPICS framework;
- (11799) DAN does not raise an error if maximum number of attributes is exceeded – fixed;
- (11903) `dan_conf_readXMLFILE` is not aligned with SDD DAN generated name convention;
- (12084) DAN client shared library does not link against required downstream libs.

## 12 Logging Library

Changes for 6.1.1:
- (11846) Fixed a bug that led to duplicated symbols in ccs-core and log libraries.

## 13 NI Sync

No Changes

## 14 PXI-6259

Changes for 6.1.1:
- (11960) Fixed a bug that caused malfunction if the PXIe-6368 driver was used in the same crate.

## 15 PXI-6528

No Changes

## 16 PXIe-6368 / PXIe-6363

Change:
- Full support for the PXIe-6363 board (lower cost, no simultaneous sampling at maximum rate) in the EPICS device support

## 17 NI RIO

Changes:
- (11230) NI RIO locking directory IRIO automatically created when driver module loaded. Previously, NI RIO fails to start if lock directory `/var/lock/nirio` is missing.
18 OPC UA

The OPC UA support component that was distributed as a prototype version has been replaced with the current version of the final implementation. While the features are more or less the same as using the prototype, the API (Makefile support, format of database links and commands in startup script) has changed. The SDD integration creates projects for the new support; using the prototype not recommended.

Changes for 6.1.1:

- The OPC UA support was updated to the latest version, supporting array data as well as server-side queues.
## DOCUMENTATION UPDATE

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- CODAC Core System Overview
- CODAC Core System User Manual
- CODAC Core System Installation Manual
- CODAC Core System Migration Guide

### INSTALLATION & SUPPORT
- CODAC Core System App Developer's Manual
- SDD Editor User Manual
- SDD Synchronization Guide
- How to include a new I/O module in SDD
- Maven Editor User Guide
- System Health Monitoring Variables
- Logging library - Software User Manual

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- How to include a new I/O module in SDD
- Maven Editor User Guide
- System Health Monitoring Variables
- Logging library - Software User Manual

### CONTROL SYSTEM STUDIO
- CODAC Core System 6.1 CS-Studio Release Notes
- CODAC Core System CS-Studio User Guide
- Operator Interface standardisation - CSS BOY Edition and Runtime
- Operator Interface standardisation - CSS BOY Industrial Symbol Library

### SLOW CONTROLLERS (PLC)
- SPSS User Manual
- s7PLCAsyn EPICS Driver User's Manual
- PLC Sample Guide

### FAST CONTROLLERS - I/O
- NI Sync Linux Device Driver User's Guide
- NI Sync EPICS Driver User's Guide
- NI PXI-6259 Linux Driver User's Guide
- NI PXI-6259 EPICS Driver User's Guide
- NI PXI-6258 Linux Driver User's Guide
- NI PXI-6258 EPICS Driver User's Guide
- NI X-Series Linux Device Driver User's Guide
- NI X-Series EPICS Driver User's Guide
- NI-RIIO Linux Device Driver User Manual
- NI-RIIO EPICS Device Driver User Manual
- IRIO Library user's manual
- IRIO Design Rules for LabVIEW for FPGA

### FAST CONTROLLERS – HPN
- TCN API - Software User Manual
- PTPd User Manual
- TCNd User Manual
- SDN Software User Manual
- DAN User manual
- SDN Archiver User Manual

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