



Atacama Large Millimeter Array

ALMA-SW-NNNN

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Report

Matej Šekoranja

ANKA ACS Installation Report

Report

Matej Šekoranja (matej.sekoranja@ijs.si)

Jožef Stefan Institute

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Author Signature:

Date:

Approved by:

Signature:

Institute:

Date:

Released by:

Signature:

Institute:

Date:

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	2002-05-06	Matej Sekoranja	4. Bugs
			RT bugs added.

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1 Introduction

This document is the report of ACS installation at ANKA during 10. -19. April in FZK.

ANKA Control System has 1 Manager, 38 Activators controlling 451 COBs.

2 Writing LonWorks ACS driver layer

The most difficult part of porting ACS to ANKA CS was to write LonWorks driver layer. To achieve good performance all benefits of LonWorks fieldbus were used, especially LonWorks on-change monitors (so called *network variables*) and support for asynchronous requests. Ignoring all benefits of fieldbus and implementing only `get` and `set` methods would be really a stupid thing.

Snapshot of all 451 devices, having approximately 2 properties per device, took a good second, i.e. 1000 calls of `get_sync` per second.

I have a few problems deriving LonWorks properties from core BACI properties:

- ? `characteristics` and some other class members should not be declared as `private`, they should be `protected`
- ? `readCharacteristics` method should not be called from constructor which makes deriving it unusable; better approach is to have additional `initialize()` method

3 MACI design issue

ANKA CS uses LonWorks for a fieldbus. First time initialization of boards, after APB is loaded, can take a lot of time – from 15 seconds up to 2 minutes. This causes activation of COBs to timeout and Manager does not mark COBs as activated. The problem gets bigger if Manager receives request to activate multiple COBs, via `get_COBs` method, making client to wait for a long time. Actually, all methods which could take a lot of execution time, let's say more than 5 seconds, should be done asynchronously (using Asynchronous Completion Token event handling design pattern – just like BACI callback mechanism).

Another issue is too strong locking of data structures by the Manager in order to make it thread-safe – especially in `get_COB` method. Imagine 38 activators at boot-time activating 451 COBs waiting for each other. Solution to this particular problem was already implemented and activators can activate COBs in parallel.

4 Bugs discovered

ACS related bugs discovered:

MODULE	PLATFORM	BUG EXPLANATION
baci (all property impl.)	All	get_history does not return last <i>n</i> values, but first <i>n</i> value in the cyclic-array.
baci (all property impl.)	All	destroy() does not delete property if m_reference is null
baci (baciMonitorMacro.h)	All	Creation of recovered monitors is done by calling BACIMonitor constructor with wrong parameter order: 'isSuspended' instead of 'false, isSuspended'
baci (baciMonitorMacro.h)	VxWorks	<p>HEADER_SCAN_SET_OBJECT_STATE, IMPL_SCAN_SET_OBJECT_STATE core dump. 'sscanf' is done to non-initialized memory space.</p> <pre>char *tmpPtr1, *tmpPtr2, *tmpPtr3;</pre> <p>should be changed to</p> <pre>char tmpPtr1[100], tmpPtr2[100], tmpPtr3[100];</pre>
baci (baciMonitorMacro.h)	VxWorks	Implementation of printLLUasString uses static buffer making this method not thread-safe. This produces weird recovery data.

4.1 RT bug entries

This section contains a list of all RT bug tickets.

<u>Id</u>	<u>Subject</u>
326	Slider bean bit increment error
370	OE: load curve does not work (sequence is not supported)
374	OE: value of pattern type should be shown also as series of bits
376	OE: oe has inconsistent input in main window / monitor window
378	AC: frozen after unsuccessful ping
379	AC: error messages in cosole must contain timestamp and affected object
381	OE: get all characteristics dialog window is too small
385	AC: items in the tree are not alphabetically sorted
404	R2: reduce amount of debug output to console
405	ATextPane: remember more characters
406	DeviceTable: it should be possible to add devices to running table
408	Abeans report events: avoid duplicate messages
410	Abeans Customizer: change default size, check help for inconistences
415	R2 Displayer: freeze if new trend pressed during timeout
418	AC, OE, logging: implement timeout handling of all remote commands
419	AC: write name and IP of host computer for each activator, client, manager
421	DeviceTable: wrong sorting in device selection dialog
425	ABeans: remote exception on characteristic is not notified in textPane
428	AC: feature RQ: button for getCOB on inactive COB
436	OE: monitor window can not closed if monitor got CORBA exception
439	OE: should cache callback parameter type info
440	DeviceTable: reconsider having set and comands for device in pop-up window
441	Trend: if contains many points, it is very CPU-hungry at window repaint
442	Slider: inform user of unsuccessful set
462	Table: strange need to select exit for each device, finally exception
463	DeviceTable: null pointer exception
475	Slider: disabling does not disable the Apply button
528	Manager behaves strange
530	OE is producing useless debug output
542	Activator silently crashed

5 Other

- ? TAO is highly configurable ORB and offers many different run-time configurations (e.g. single-threaded ORB, multi-threaded ORB: thread-per-connection, thread-pool model, etc.). Tuning TAO can improve server performance and scalability. This has to be investigated.
- ? CommandLine CDB parameter should be parsed. For CommandLine is ANKA parsed for %COMPUTERNAME% environment variable which makes Activator ORBEndpoint configuration easier. Since every Activator should have its own reserved ORB endpoint, we simply set CommandLine to `-ORBEndpoint iiop://%COMPUTERNAME%:30xx/`