SKA - LMC Standard Files Location

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Abstract

This Memo describes a proposal for a unified location of relevant files for all LMCs development. While this issue may appear a minor one, a standard file structure greatly simplify the interchange of code, and the consequent synergy.

The proposal follows the main guidelines of the `Linux Filesystem Hierarchy Standard` (`FHS`).

DOCUMENT HISTORY

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First Draft	20 Apr 2016		

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Application		Version	Filename
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Contents

List of Figures

List of acronyms

ADD: Architecture Design Document

AIV: Assembly, Integration and Verification

ARC: Architecture Work Package

ASIC: Application Specific Integrated Circuit

CA: Consortium Agreement

CAD: Computer Aided Design

CDR: Critical Design Review

CDRL: Contract Data Requirements List

CM: Configuration Management

COTS: Commercial Off-The-Shelf

CP: Construction Plan

CSP: Central Signal Processor

DDD: Detailed Design Document

DSH: Dish Element or Consortium

DSP: Digital Signal Processing

ECP: Engineering Change Proposal

EICD: External Interface Control Document

FHS: linux Filesystem Hierarchy Standard

FPGA: Field Programmable Gate Array

GPU: General Processing Unit

ICD: Interface Control Document

IICD: Internal Interface Control Document

INFRA: Infrastructure Element or Consortium

LMC: Local Monitor and Control

LFAA: Low Frequency Aperture Array Element or Consortium

M&C: Monitor and Control

MOU: Memorandum of Understanding

MTTR: Mean Time To Repair

QA: Quality Assurance

PDF: Portable Document Format

PDR: Preliminary Design Review

PIP: Physical Implementation Proposal

PTP: Prototyping Plan

QA: Quality Assurance

QAP: Quality Assurance Plan

QC: Quality Control

QP: Quality Plan

REN: Requirements Engineering Work Package

SAD: System Baseline Design

SADT: Signal and Data Transport Element or Consortium

SDE: Software Development Environment (Work Package)

SDP: Science Data Processing

SEMP: System Engineering Management Plan

SKA: Square Kilometer Array

SKAO: SKA Organization (or office)

SMART: Software Methods, Approaches, Research, and Technologies

SOW: Statement of Work

SPA: Software Product Assurance

SW: Software

SYSML: System Engineering Simulation Language and application

TBC: To be confirmed

TBD: To be decided

TDT: Time Domain Team

UML: Unified Modeling Language

VPL: Verification Planning Work Package

WBS: Work Breakdown Structure

WP: Work Package

1 Introduction

The different branches of SKA LMC, developed by different groups can greatly benefit from a synergy which may obtained by code sharing.

In order to make easer the interchange of code between different groups, here we propose a standard file structure. This proposal follows the main guidelines of the `Linux Filesystem Hierarchy Standard`[1].

2 General Structure

During the performed discussions at the Trieste LMC Harmonization Meeting, the possibility of exchange the developed code and work approaches was well accepted and considered fruitful from most of the LMC development groups.

It was also discussed about the adoption of a standard tools setting in the main instrument in order to enable inter-operation. For that, we found the opportunity of a standard file location policy. We propose to use a structure, based on `FHS` (`Linux Filesystem Hierarchy Standard`). `FHS`, according to our experience has proven to be easy to use and robust.

To make this approach easier, we propose also a standar Tango home location. Using the source tarball, the default Tango install location is under `/usr/local`. We propose to use a packaged Tango version[1] and to use as default location the `/usr` directory, as already is the case of Debian derived distribution bin packages.

2.1 Main Location and Structure

In the framework of `FHS` the main choice we propose is **to place the main LMC hierarchy under the `/opt` directory**.

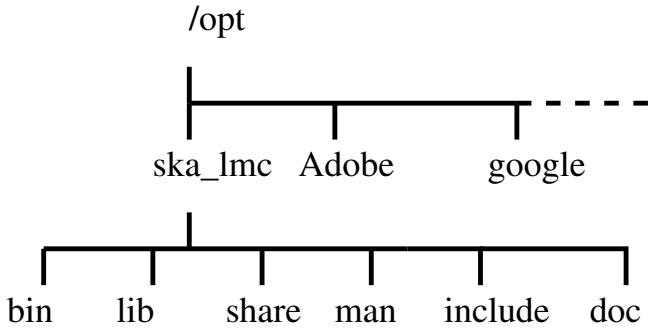

Figure 1: Example structure of `/opt` directory with `ska_lmc` directory

All LMC programs should reside inside the `/opt/ska_lmc` directory. Following the `FHS` directives, inside `/opt/ska_lmc` there will be a complete binary/library/include/ ... hierarchy, as shown in Fig. 1.

It is also possible, for the SKA programs, to access some other top level directories, in particular `/etc` and `/var` for configuration, logging and process management, as will be described in section 3.

The content of each of the principal subdirectories of `/opt/ska_lmc` is as follows:

1. `/opt/ska_lmc/bin`: Here are located all LMB executables.
2. `/opt/ska_lmc/lib`: in this directory resides the LMC library files, the SKA custom version of standard libraries. The practice to put into `/opt/ska_lmc/lib` daemon executables is deprecated.
3. `/opt/ska_lmc/include`: in this directory there are all the declaration files (*include file*) necessary for the compilation of the LMC servers. Sometimes also some run-time definition files can be placed here instead of `/opt/ska_lmc/share`.

[1] A packaged version can be easily obtained from the tarball using an installation handler as `checkinstall`

4. /opt/ska_lmc/man: this directory contains short manuals of the various executable file, in *man* format. As for FHS standard it should be a soft-link from /opt/ska_lmc/share/man to here.

5. /opt/ska_lmc/doc: in this directory is present a more extensive documentation of the various executable files, in a non-man format. Most common formats are *pdf, ps, tex and HTML*. This documentation s intended to complement and complete those present in the /opt/ska_lmc/man.

6. /opt/ska_lmc/share: this directory contains various auxiliary files to be used by the executable in /opt/ska_lmc/bin. The contents could be images, default configurations, and other useful information. In the FHS standard it is suggested the use of sub-directories with names /opt/ska_lmc/share/<program_name> to avoid naming conflicts.

2.2 Alternative names

The /opt/ska_lmc base directory name is of course arbitrary. Equally good names could be:

1. /opt/skalmc
2. /opt/SkaLmc
3. /opt/lmc
4. /opt/LMC
5. /opt/SKA

3 Files outside /opt/ska_lmc

FHS standard allows programs located in the /opt hierarchy to have some auxiliary files outside this top level directory. The most common uses for this exception are for configuration and log files.

3.1 Configuration Files

In the /etc/ska_lmc directory it can resides any configuration file relative to ska_lmc programs. The suggested configuration file name is /etc/ska_lmc/<program_name>.ini. These files contains *global* configuration or default files. If there are the needs of *instance specific* configuration files, these can be conveniently placed in a sub-directory named /etc/ska_lmc/<program_name>/.

3.2 Log Files

Log files are normally placed in the /var/log directory.
However it is suggested ska_lmc programs would place their log files in the /var/log/ska_lmc/ directory, and the resulting log file name would be /var/log/ska_lmc/<program_name>.log.

As usual there is the recommendation to periodically rotate log files. Tango logging system already offer this possibility, even if limited to only one backward file. For more complex schema, the use of the logrotate program is recommended.

If the ska_lmc do not have the right to write into /var/log/ska_lmc/ directory, it is suggested to use the alternative location /var/tmp.

3.3 The ID Process Files

The so called *pid* files (Process IDentification files) normally are located into /var/run directory, along with *named pipes*.
The standard conventions for their names is /var/run/<program_name>.pid and /var/run/<program_name>.sock.

If the ska_lmc do not have the right to write into /var/run directory, it is suggested to use the alternative location /var/tmp.

3.4 Lock Files

The files which lock a resource to a specific process are located in the `/var/lock` directory. The recommended name is `/var/log/LCK..<resource_name>` (note the TWO points inside name).

If the `ska_lmc` do not have the right to write into `/var/lock` directory, it is suggested to use the alternative location `/var/tmp`.

3.5 Research Paths Update

To ease the accessibility of programs, libraries and resource files located inside the `/opt/ska_lmc` directory, we propose to define a environment symbol `SKADIR` and to update the executable research path and the man research path to include those locations.

In debian derived distribution, this task can be easily accomplished by including the following files (`ska_lmc.sh` and `ska_lmc.csh`) in the `/etc/profile.d` directory.

`softir.csh:`

```
#!/bin/csh
# /etc/profile.d/softir.csh - SOFTIR additions:
if ( ! $?SKADIR ) then
    setenv SKADIR /opt/ska\_lmc
endif
if ( $?PATH ) then
    set path = ( $path $SKADIR/bin )
else
    set path = ( $SKADIR/bin )
endif
if ( $?MANPATH ) then
    setenv MANPATH ${MANPATH}:$SKADIR/man
else
    setenv MANPATH $SKADIR/man
endif
```

`softir.sh:`

```
#!/bin/sh
# /etc/profile.d/softir.sh - SOFTIR additions:
SKADIR=/opt/ska\_lmc
PATH=$PATH:$SKADIR/bin
MANPATH="${MANPATH}:/opt/ska\_lmc/man"
export SKADIR PATH MANPATH
```

It is also advisable to include `/opt/ska_lmc/lib` into the `ldconfig` research path, for instance in the the `/etc/ld.so.conf` file or in the `/etc/ld.so.conf.d` directory.

References

[1] "Filesystem Hierarchy Standard", R.Russell, D.Quinlan, C.Yeoh, 2004, Rev 2.3, presso http://www.pathname.com/fhs/

[2] "Internet Core Protocols: The Definitive Guide" E. Hall, Sebastopol, CA (USA), 2000.