New MPD Build System

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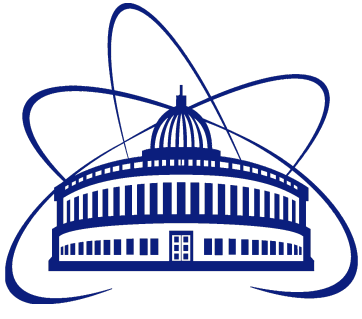


Presentation: https://ndmspc.gitlab.io/slides/jinr/nica/20211223

CURRENT MPDROOT USAGE

- On Desktop/Notebook
  - prepare (any) linux based computer and install prerequisities
  - install FairSoft + FairRoot
  - build MPDRoot
  - optionally install MPDRoot (almost no-one uses this option)
  - start working with MPDRoot (after 2+ hours of initial setup)
- On HybriLIT
  - module add FairRoot/v18.2.1 (newer don't work)
  - add any more required modules (guessing game)
  - build MPDRoot
  - ..

PROBLEMS WITH CURRENT APPROACH

- too much effort to prepare MPDRoot environment for regular users (physicist) - users tend to use same old version of MPDRoot for long time
- mixed versions of installed dependencies on users computers
- hard to keep track on dependencies
- projects on which MPDRoot depends are installed inside MPDRoot instead of being linked to
- macro directory contains users (non-general) macros as well as unsupported ones
- macros rely on variable `$VMCWORKDIR` shared across multiple FairRoot-based projects

New Approach

USER - VIA CLUSTER

LOG-IN (ALWAYS)

```
ssh username@hydra.jinr.ru
source /cvmfs/nica.jinr.ru/sw/os/login.sh
module add mpdroot
```

USAGE

```
root -b -q $MPDROOT_MACROS/common/runMC.C
```

AVAILABLE VARIABLES

```
$MPDROOT - main installation (not source) directory
$MPDROOT_MACROS - directory containing example macros ($MPDROOT/macros)
$GEOMPATH - path to geometry directory
$CONFIG_DIR - gconfig
```

DEPRECATED

```
$VMCWORKDIR - still available but can be removed later
```

LOCAL INSTALLATION

```
bash <(curl -s https://git.jinr.ru/nica/nicadist/-/raw/master/scripts/nica-init.sh)
```

- Script will install
  - cvmfs
  - podman
  - toolbox
- OS supported
  - Fedora 34, 35
  - CentOS 7, 8
  - Debian 11
  - Ubuntu 18.04, 20.04, 21.10
  - Mint 20.2
  - Pop!_os 20.04

DESKTOP/NOTEBOOK

START CVMFS

```
sudo systemctl start cvmfs  # one-time start of cvmfs before usage
sudo systemctl enable cvmfs # start cvmfs on boot
```

USAGE

```
toolbox enter c7-nica-dev
module add mpdroot
root -b -q $MPDROOT_MACROS/common/runMC.C
```

DEVELOPMENT ON DESKTOP/NOTEBOOK WITH CVMFS

INITIALIZATION

```
sudo systemctl start cvmfs  # one-time start of cvmfs before usage
toolbox enter c7-nica-dev
module add mpddev
```

FIRST TIME CONFIGURATION

```
git checkout https://git.jinr.ru/nica/mpdroot
mkdir mpdroot/build && cd mpdroot/build
export $MPDROOT=/path/to/install
cmake ..
```

BUILD

```
make -j5 install
```

TEST RUN

```
source $MPDROOT/etc/env.sh
root -b -q $MPDROOT_MACROS/common/runMC.C
```

DEVELOPMENT - VIA CLUSTER

LOG-IN (ALWAYS)

```
ssh username@hydra.jinr.ru
source /cvmfs/nica.jinr.ru/sw/os/login.sh
module add mpddev
```

FIRST TIME CONFIGURATION

```
git checkout https://git.jinr.ru/nica/mpdroot
mkdir mpdroot/build && cd mpdroot/build
export $MPDROOT=/path/to/install
cmake ..
```

BUILD

```
make -j5 install
```

USAGE

```
source $MPDROOT/etc/env.sh
root -b -q $MPDROOT_MACROS/common/runMC.C
```

MPDROOT VIA ALIBUILD

FIRST TIME CONFIGURATION

```
mdkir $HOME/nica
cd $HOME/nica
git clone https://gitlab-hlit.jinr.ru/nica/nicadist.git alidist
toolbox create -c c7-nica-dev -i registry.gitlab.com/ndmspc/user/c7:alibuild-dev
```

BUILD OF MPDROOT

```
toolbox enter c7-nica-dev
cd $HOME/nica
aliBuild build mpdroot --debug
```

USAGE

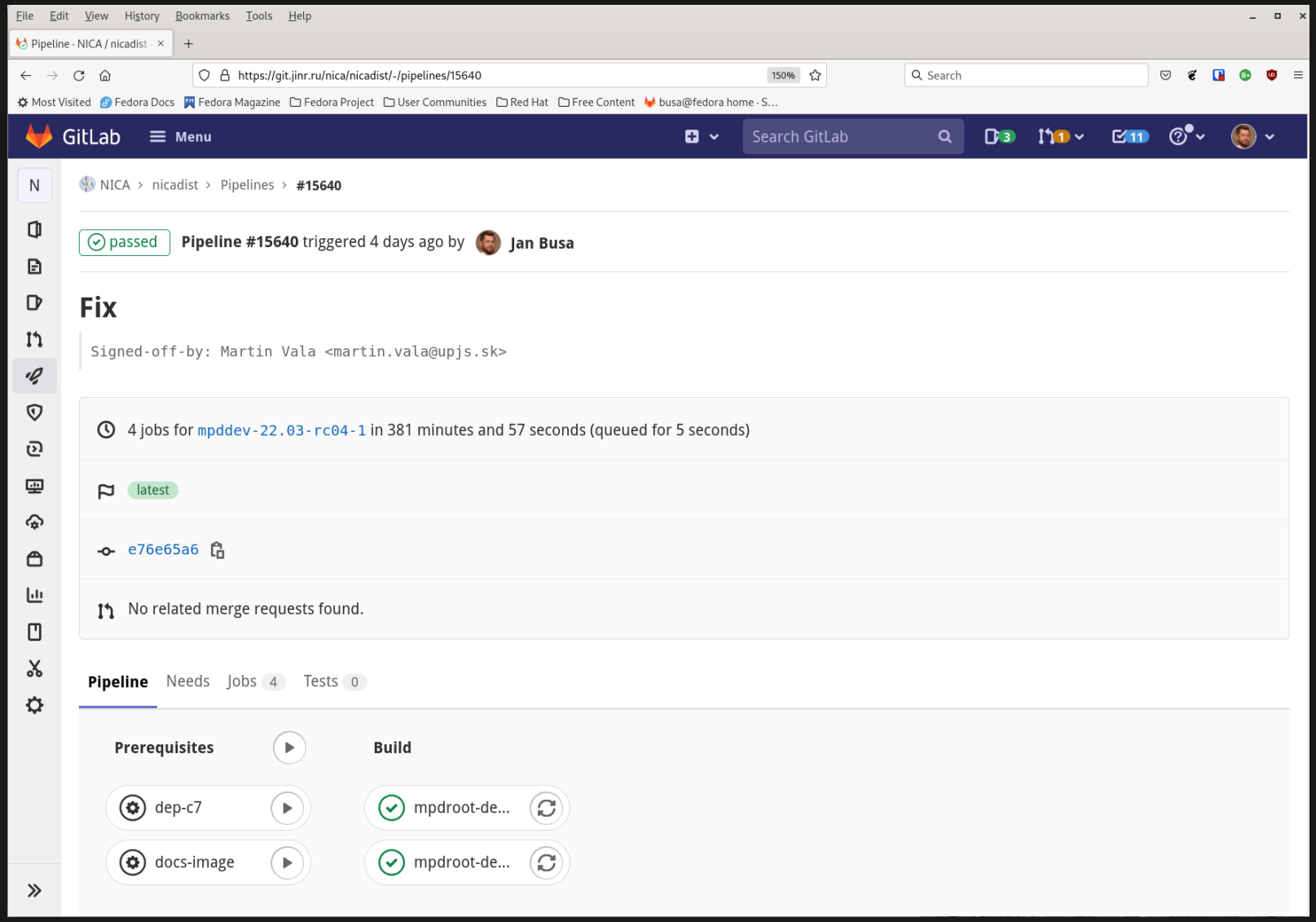
```
cd $HOME/nica
alienv enter mpdroot/latest
```

PROPOSED NEW APPROACH TO BUILD

- build system based on aliBuild - https://alisw.github.io/alibuild
- each package has a configuration script - "recipe" which describes its build process and dependencies
- NICAdist project - https://git.jinr.ru/nica/nicadist - fork of alidist with additions towards NICA reusing most of the recipes (e.g. FairRoot) from alibuild
- added scripts necessary for MPDRoot (e.g., Eigen3, mpddev)
- (almost) all packages are built from sources (including compiler and basic tools like CMake, libSSL, libXML2) - currently 35 packages
- build process runs inside minimalistic containers - CentOS7 and CentOS8 supported by us
- for each package we can trace back packages versions as well used base operating system - we can restore any version
- if some package changes, all dependent packages are rebuilt automatically

HOW BUILD PROCESS WORKS

- trigger
  - tag with `<tag_name>` created in `mpdroot`
  - push to dev branch
- build pipeline is triggered automatically in nicadist project - WIP
- package `mpdroot` is build on CentOS7 and CentOS8 and deployed to cvmfs
- deploy `mpdroot` to `/cvmfs/nica.jinr.ru`
  - tags: `/cvmfs/nica.jinr.ru/sw/slc*`
  - dev branch: `/cvmfs/nica.jinr.ru/sw/tmp/slc*`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Pipeline · NICA / nicadist
https://git.jinr.ru/nica/nicadist/-/pipelines/15640
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NICA › nicadist › Pipelines › #15640
passed
Pipeline #15640 triggered 4 days ago by Jan Busa
Fix
Signed-off-by: Martin Vala <martin.vala@upjs.sk>
4 jobs for mpddev-22.03-rc04-1 in 381 minutes and 57 seconds (queued for 5 seconds)
latest
e76e65a6
No related merge requests found.
Pipeline Needs Jobs 4 Tests 0
Prerequisites
Build
dep-c7
docs-image
mpdroot-de...
mpdroot-de...

ADVANTAGES

- any NICA project (BM@N, SPD) can join - one needs only to create proper recipe files
- if necessary, defaults can be fixed according to the project needs (e.g. each project can use different FairRoot version)
- it is easy to test build with upcommig versions of dependent projects
- it is easy to link multiple projects (split them to parts reusable by individual software packages)
- possibility of creating user specific tags

SUMMARY

- We use alibuild as base for our build system
- NICAdist fork of aliDist project was created
- automatic build pipelines
- multiple OS supported via toolbox
- supported MPDRoot modes
  - user - via cvmfs (localy or on server)
  - developer - dependencies via cvmfs
  - developer - build from scratch via alibuild
- documentation http://nica.pages.jinr.ru/nicadist/ - WIP