Software Distribution System for the BmnRoot Framework

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Outline

- New CernVM-FS repository bmn.jinr.ru

- Auxiliary bmndist GitLab project

- Overview of the new user container

- Running batch jobs in containers

New CernVM-FS Repository

- The nica.jinr.ru repo is shared with MPD and SPD

    - Periodic open transaction conflicts

    - No common file structure leading to confusion and mess

    - Other experiments have full access to published BM@N software and can accidentally (or intentionally) modify it

- New bmn.jinr.ru is exclusive to BM@N

- The nica.jinr.ru repo is now considered legacy in context of BM@N and will not be updated anymore

New CernVM-FS Repository Structure

- Old scheme:
  /cvmfs/nica.jinr.ru/OS/sw_type/version

- New scheme:
  /cvmfs/bmn.jinr.ru/sw_type/version/architecture
  -OS

```
/cvmfs/bmn.jinr.ru
├── bmn
│   └── x86_64-centos7
├── bmnroot
│   └── x86_64-centos7
│       └── dev
├── fairroot
│   ├── bmn -> /cvmfs/bmn.jinr.ru/fairroot/v18.6.8
│   ├── latest -> /cvmfs/bmn.jinr.ru/fairroot/v18.6.8
│   └── v18.6.8
│       ├── x86_64-alma9
│       ├── x86_64-centos7
│       └── x86_64-ubuntu2204
└── fairsoft
    ├── apr22
    │   ├── x86_64-alma9
    │   ├── x86_64-centos7
    │   └── x86_64-ubuntu2204
    ├── bmn -> /cvmfs/bmn.jinr.ru/fairsoft/apr22
    └── latest -> /cvmfs/bmn.jinr.ru/fairsoft/apr22
```
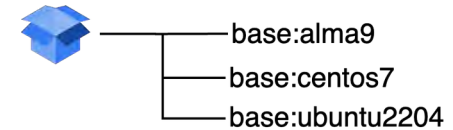
Auxiliary bmndist project

- git.jinr.ru/nica/bmndist is the replacement for the **Docker Images** project dedicated to BM@N

- Docker Images will be archived (made read-only) after agreement with SPD (MPD already moved to nicadist)

- **bmndist** serves as a container registry, but is planned to be extended to also publish FAIRSOFT and FAIRROOT in CVMFS

- Connection with other projects:

  - Rebuilds of user containers are triggered on every new push to bmnroot Git repository

  - git.jinr.ru/cvmfs-container-sync/registry periodically converts base image to singularity format and publishes it in CVMFS
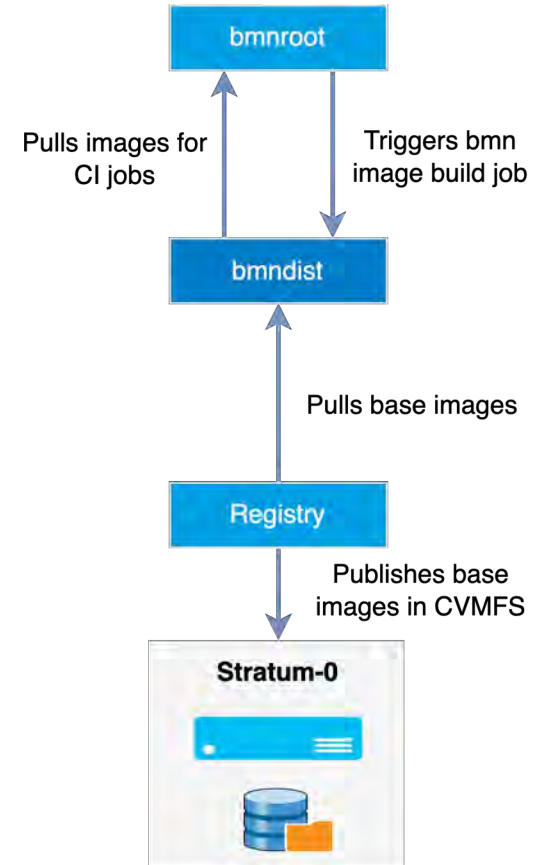
Supported Containers

- Three container flavors: **base**, **fair** and **bmn**

- **base** includes OS and packages required to build FAIRSOFT and FAIRROOT
  - Used as a base for other images, in CI jobs of bmnroot project and can be used in batch systems
  - **alma9**, centos7, **ubuntu2204** tags are supported

- **fair** is built on top of **base** with the addition of FAIRSOFT and FAIRROOT
  - Used as a base for **bmn** images and CI jobs of bmnroot project
  - {FAIRSOFT_VERSION}-{FAIRROOT_VERSION}-{OS_VERSION}[-ci] (e.g. apr22_v18.6.8-alma9-ci)
  - Same OSes as of base images are supported

- **bmn** is based on **fair** and includes bmnroot
  - Is supposed to be used only on personal machines
  - {BMNROOT_VERSION}-{OS}[-cvmfs] (e.g. dev-ubuntu2204)
  - Only alma9 and ubuntu2204 are supported

Base Images

- base:alma9
- base:centos7
- base:ubuntu2204

FAIR Images

- fair:apr22_v18.6.8-alma9
- fair:apr22_v18.6.8-alma9-ci
- fair:apr22_v18.6.8-centos7-ci
- fair:apr22_v18.6.8-ubuntu2204
- fair:apr22_v18.6.8-ubuntu2204-ci

User Images

- bmn:dev-alma9
- bmn:dev-alma9-cvmfs
- bmn:dev-ubuntu2204
- bmn:dev-ubuntu2204-cvmfs

User Container

- New software distribution system for use on personal computers developed by **Rinat Nizamov**

- Consists of a set of container images and an installation script (https://git.jinr.ru/nica/bmndist/-/tree/main/images/bmn)

- The installation script installs Apptainer (former Singularity), downloads the **bmn** image from the bmndist registry and adds shell command aliases to start/rebuild the container

- Two OS versions of containers are available: AlmaLinux 9 and Ubuntu 22.04

- There are also two flavors of user images:

  - Cvmfs-based – smaller in size, but requires network to fetch FAIRSOFT/FAIRROOT

  - Self-contained

- When installed, it is basically just an new folder $HOME/bmn-container with the filesystem of the container

Running Batch Jobs in Containers

- Make jobs independent of cluster OS

    - It is like running a job in a lightweight virtual machine

- Apptainer runtime is most widely used in Grid infrastructures

    - Available at CICC

    - Request to install at HybriLIT/Govorun is pending

- Container images can be installed in cvmfs

    - Images can be added through the image publication service: https://git.jinr.ru/cvmfs-container-sync/registry (see JINR Container Distribution Service at GRID2023 for details)

    - base:centos7 and base:alma9 images already available in /cvmfs/container.jinr.ru/nica/bmndist
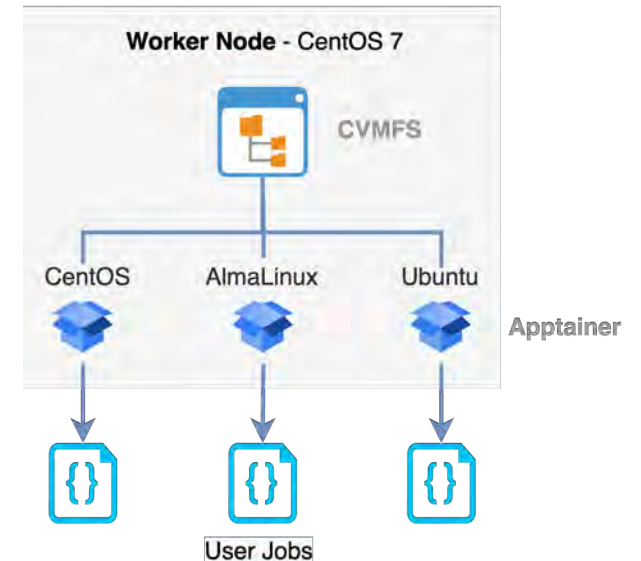
Thanks!

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