

## Distributed Repository Framework (DRF)

### Overview

The process of digital content production in the media industry is performed nowadays often distributed over different locations. In such a networked distributed production chain, various types of metadata are produced locally, which are very useful in subsequent steps of the production and marketing chain. A multi-site repository, in which everyone can access what he needs, is an important building block for the realization of a networked distributed production chain.

Because such a repository must be highly adapted to the individual production environment, a framework of modules for realization of customized content and metadata repositories has been developed as a prototype. In order to show the applicability of the framework, a networked distributed content and metadata repository for the TOSCA-MP final demonstrator has been realized based on its specific requirements.

### In-depth Description

A networked distributed content and metadata repository implementation, which is realized based on modules of the DRF, consists of a number of local repositories which are administrated and managed by a central instance, the DRF MainModule. Beside the administration, configuration, and lifecycle management of the connected local repositories, the DRF MainModule aggregates the information about all data that are stored in the connected local repository and provides this information on a common REST web service based interface to the user applications. The internal communication between the DRF MainModule and the different local repositories is realized in the DRF Message System. An overview of the DRF modules is given in Figure 18.

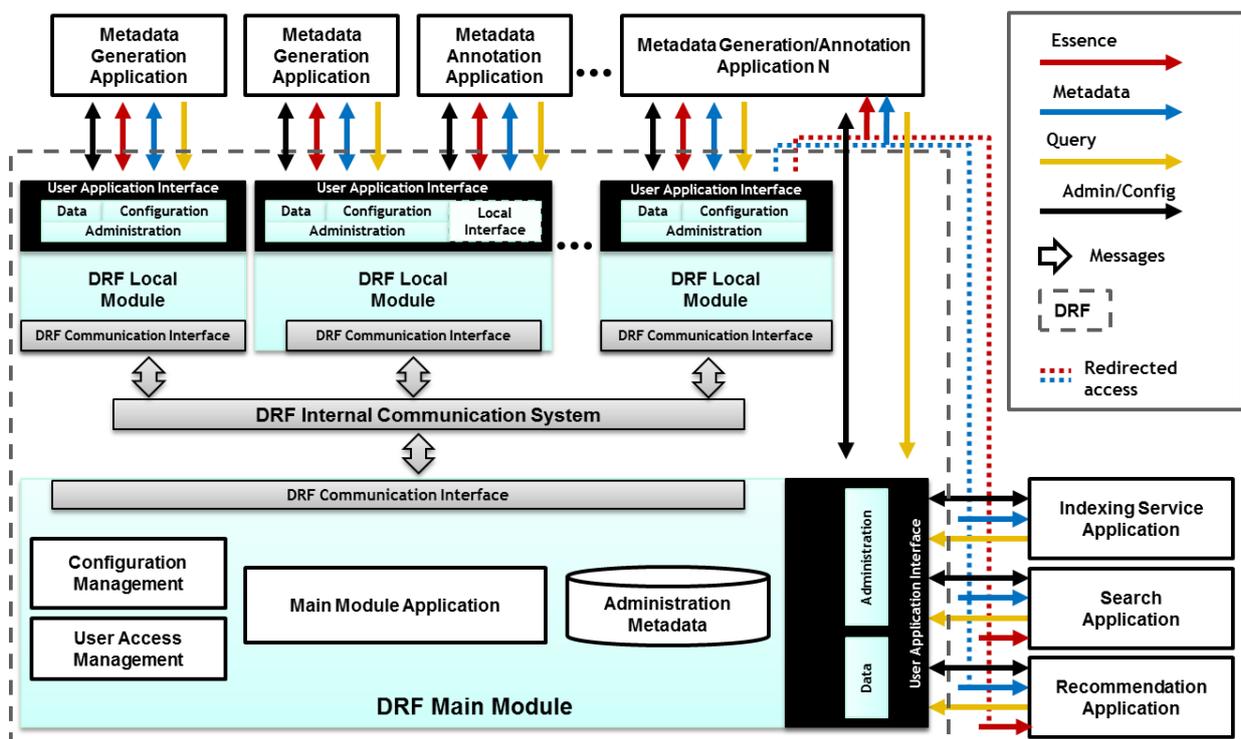


Figure 18. Structure of the Distributed Repository Framework (DRF)

The DRF provides realizations of various types of local repositories with various sets of functionality. This means that integrated local repositories could consist of various types of internal storage for essence and metadata, depending on the requirements of the associated local user applications. It is conceivable that the DRF will provide a local repository based on databases with clearly defined internal data models for dedicated types of metadata, or a very flexible repository with an XML-file-based metadata storage, able to store metadata independent of the metadata format used. Regarding the type

of storage, local repositories can consist of relational databases, triple stores, graph databases or special types of file systems. In any case, a local repository is encapsulated by a DRF LocalModule, which realizes the local DRF configuration and data administration task and the communication with the DRF MainModule. In addition, it provides the content of the local repository file based on a common REST web service based interface.

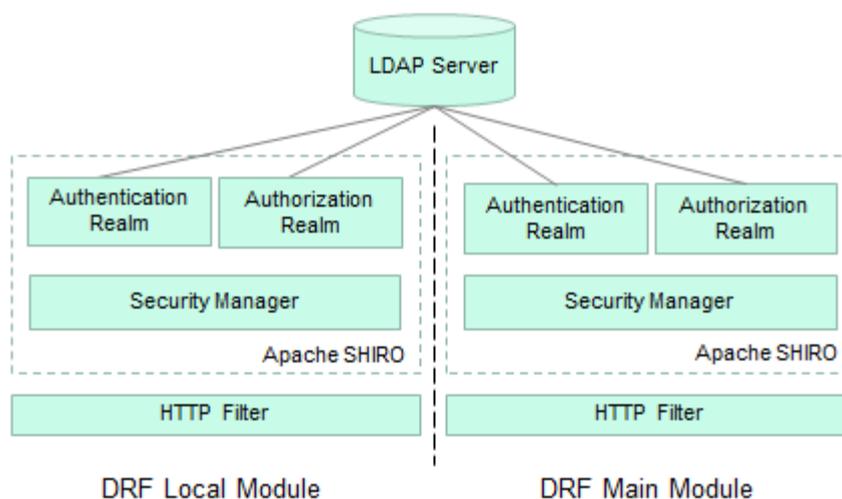
To be universal regarding different data types, the general implementation of the DRF is completely independent of specific metadata formats and does not include any functionality for metadata analysis, manipulation and format transformation. Depending on the requirements of the user application, such functionality can be realized in the form of additional services on top of the DRF. This modular separation enables the realization of a common distributed repository for various types of metadata formats and schemas. The user of the repository, who is familiar with the used metadata formats and schemas, can use the repository in the way he needs it.

Based on this open architecture it is possible to integrate existing third-party repositories in the form of a local repository. As an example for the integration of external repositories, the TOSCA-MP final demonstrator includes an integration of the content and metadata repository MAMMIE from partner VRT.

Beside the general configuration task, the DRF configuration management module (see Figure 18) realizes various functionalities for simple integration and removal of DRF LocalModules and for control of their life-cycle. This includes:

- Temporary Offline Mode of a connected local repository. Is a DRF LocalModule temporarily offline, it buffers all data messages in an internal Redis database. After a reconnect to the MainModule, the LocalModule sends all these buffered messages to inform the MainModule about changes in the data-set during the time interval of non-connectivity.
- A heartbeat mechanism, which permanently sends life messages in a ping-pong mode between the DRF LocalModule and MainModule. The automatic evaluation of these messages provides the information about their connectivity to each other and enables the possibility for realization of actions to maintain data integrity (e.g. automatic switch to Offline Mode).
- Automatic data synchronisation between DRF LocalModule and DRF MainModule during DRF LocalModule registration or removal.

As depicted in Figure 18, the DRF also includes a module for the realization of user and access management. The User Access Management Module realizes the management of individual user accounts, their authentication and authorization, and performs access control based on granted roles. The module has been implemented using Apache Shiro in combination with the Lightweight Directory Access Protocol (LDAP). Figure 19 depicts the components of the module in the DRF MainModule and DRF LocalModule.



**Figure 19: User Access Management Architecture**

***Potential Fields of Application***

The developed distributed repository framework can be used for the realization of customized content and metadata repositories for various kinds of networked distributed media production chains. Based on the available set of modules, the target content and metadata repository can be realized according to the requirements of the individual media production chain.

***Possibilities for Exploitation***

Exploitation of the results will be done through Technicolor's business unit "Creative Services" or on a bilateral licensing agreement basis.

***Further Information***

Further technical information is available in the TOSCA-MP deliverables D5.1, D5.2.1, D5.2.2, D5.3 and D5.4.

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