ARCHIVE TUTORIAL

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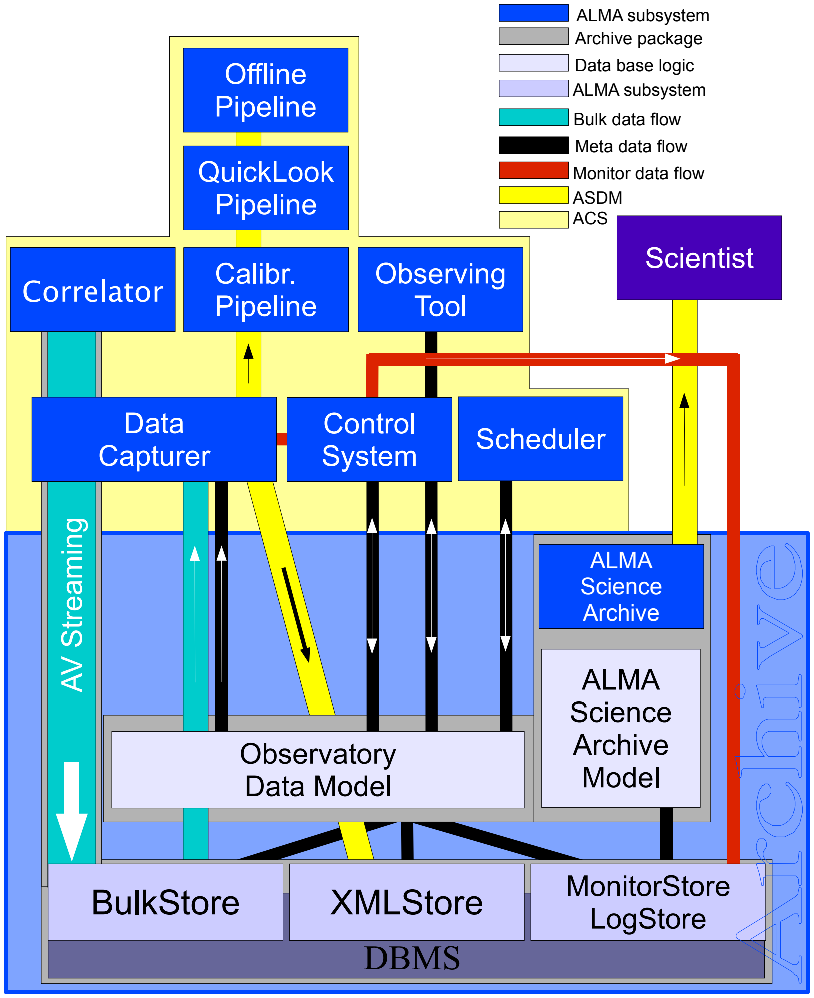
- ➜ Overview
- ➜ dbConfig file (Archive backend)
- ➜ Starting the Archive
- ➜ `XMLEntityStruct`: communicating documents
- ➜ Unique Identifiers for documents
- ➜ The XMLstore Interface
- ➜ Advanced UID usage
- ➜ Command line tools
- ➜ Useful Web pages
- ➜ UserRepository
- ➜ Not covered:
  - ➜ bulk data transfer
  - ➜ Archive manager (going to be replaced)
  - ➜ MonitorStore and LogStore
  - ➜ Science Archive

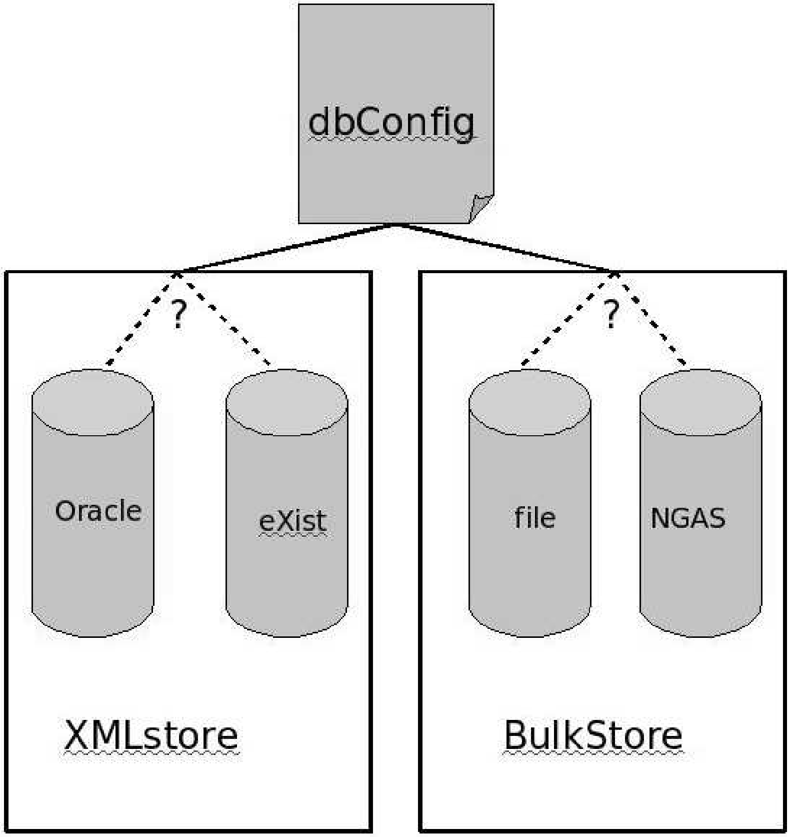
ALMA Archive Architecture



A. Wicenec 2006-09-18

ARCHIVE BACKENDS

- ➜ The Archive has two areas for storage: XMLstore and BulkStore
- ➜ Each area is implemented by local and central version
- ➜ Configuration file controls which version is used



dbConfig file

- ➜ specifies which Archive backend is used
- ➜ changed in the future (backward-compatible)
- ➜ default: in `archive_database.jar`. Override:
  1. ① `dbConfig.properties` in working directory
  2. ② `dbConfig.properties` in `$ACSDATA/config`

```
archive.db.backend=xmldb
archive.db.mode=test

archive.xmldb.driver=org.exist.xmldb.DatabaseImpl
archive.xmldb.name=db

archive.oracle.location=archive1:1521
archive.oracle.user=almatest

archive.ngast.server=archive1
archive.ngast.storeInNgast=False
archive.ngast.testDir=$ACS.data/tmp

archive.bulkreceiver.schema=sdmDataHeader
```

STARTING THE ARCHIVE

Either through master component **or** through `archive start`

- ➜ `archive start`:
  - ➜ starts tomcat, user repository and brings master component to operational
  - ➜ prerequisite: ACS and Archive components running
- ➜ Master component: bring to operational
  - ➜ will **not** start tomcat (necessary for eXist)
  - ➜ do **tomcat start** before

All of this: **only** in test code, not in operational code!

XMLEntityStruct

- used in most communication with Archive

-
  ```
  struct XmlEntityStruct
    {
      string xmlString;
      string entityId;
      string entityTypeName;
      string schemaVersion;
      string timeStamp;
    };
  ```
- Construct an XmlEntityStruct out of binding class:

```
EntitySerializer serializer = EntitySerializer
              .getEntitySerializer(logger);
XmlEntityStruct xmlEntity = serializer
              .serializeEntity(obsproposal);
              // obsproposal Castor binding class
```

UNIQUE IDENTIFIERS (UIDS)

have the form of a URI:

`uid://`*archiveID*`/`*global*`/`*local*

e.g.: `uid://X01/X2a/Xd`

- ➜ Each part is a hexadecimal number
- ➜ Assign UID to an entity (Java only):

  ```
  containerServices.assignUniqueEntityId(EntityT
  entity)
  ```

- ➜ Otherwise: UIDs must be fetched:

  ```
  IDENTIFIER_ARCHIVE.getIdNamespace()
  ```

  (or other possibilities)
- ➜ UID syntax checking provided
- ➜ No semantics behind UIDs (apart from archiveID)

Archive Interface

- ➜ Interface for storing, deleting and querying XML documents
- ➜ Document is identified by UID
- ➜ Document versions stored internally, but not visible to outside
- ➜ Components: `ARCHIVE_IDENTIFIER` , `ARCHIVE_CONNECTION`, `OPERATIONAL`, `ADMINISTRATIVE`

- ➜ `void` **store**`(in xmlentity::XmlEntityStruct entity)`
- ➜ `void` **update**`(in xmlentity::XmlEntityStruct entity)`
- ➜ `void` **un/delete**`(in URI identifier)`
- ➜ `StatusStruct` **status**`(in URI identifier)`
- ➜ `xmlentity::XmlEntityStruct` **retrieve**`(in URI identifier)`
- ➜ `Cursor` **query**`(in string query, in string schema)`
- ➜ All of the above: in `OPERATIONAL`

`void` **store** `(in XmlEntityStruct entity):`

- ➜ Stores a new XML document using `entityId` in `entity` as UID.
- ➜ If UID already exists: exception

`void` **update** `(in XmlEntityStruct entity):`

- ➜ Updates an existing XML document using `entityId` in `entity` as UID.
- ➜ If UID does not yes exist: exception

`void` **delete** `(in URI identifier):`

- ➜ deletes (logically) a document
- ➜ can always be restored

`void` **undelete** `(in URI identifier):`

- ➜ restores a deleted version

`StatusStruct` **status** `(in URI identifier):`

- ➜ returns status information for document

A `StatusStruct` contains the following fields:

- ➜ `URI schema`
- ➜ `string owner`
- ➜ `string locks` (unused in the moment)
- ➜ `boolean deleted`
- ➜ `boolean dirty`
- ➜ `boolean hidden`

`boolean` **exists** `(in URI identifier):`

- ➜ returns true if documents exists in database

`boolean` **checkUIDsyntax** `(in string uid):`

- ➜ in `ARCHIVE_IDENTIFIER`
- ➜ returns true if syntax is correct

`XmlEntityStruct` **retrieve** `(in URI identifier):`

- ➜ retrieves a document

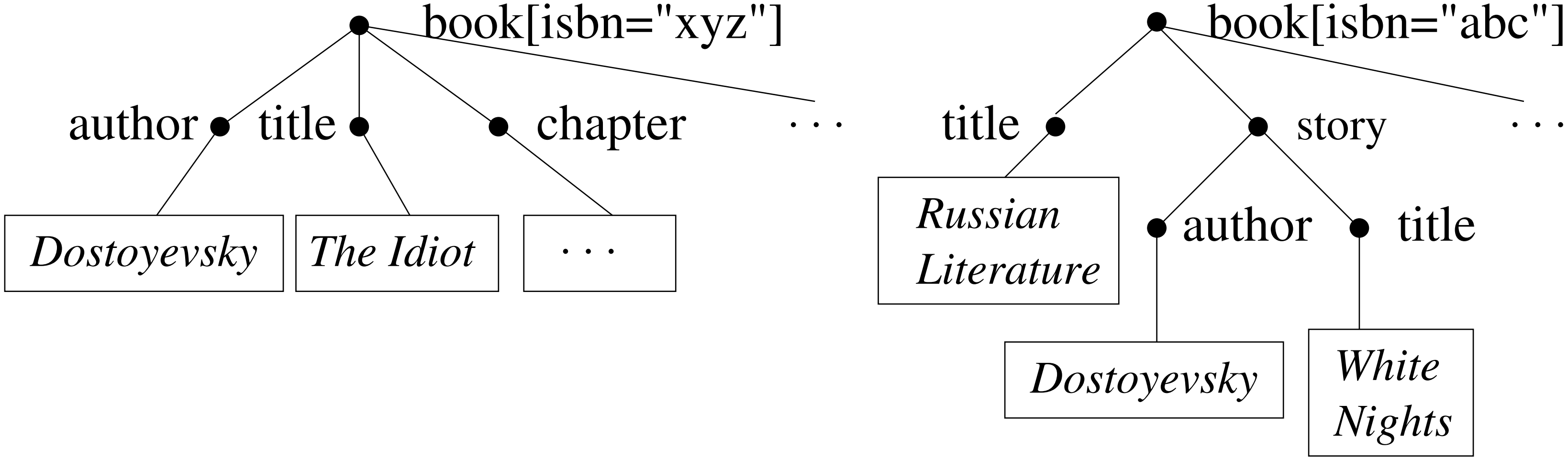
`Cursor` **query** `(in string query, in string schema):`

- ➜ XPath query against document
- ➜ Returns `Cursor` object containing document fragments
- ➜ query must contain namespace prefixes
- ➜ **Cursors must be closed after usage**: `cursor.close()`
- ➜ Variations: `queryRecent(in string schemaname, in string timestamp)` and `queryUIDs( in string query, in string schema)` both return array of matching document UIDs.

EXCURSION: XPATH

W3C standard for "pointing" at parts XML documents, similar to paths in file systems:

```
/book/title
/book//title
/book[./author="Dostoyevsky"]/title
/book@isbn
```



Example XML document:

```
<book isbn="xyz">
  <author> Dostoyevsky </author>
  <title> The Idiot </title>
  <chapter> ... </chapter>
  ...
</book>
```

SYNTACTIC CONSTRUCTS:

- `/` child step
- `//` descendant step
- `.` self step
- `..` parent step
- `@` attribute step
- Simple functions
- Unabbreviated syntax: richer language

CURSOR

- ➜ Simple instrument to deal with big result sets
- ➜ works like `Iterator` in Java:
  - ➜ Method `hasNext()` to check whether more results exist
  - ➜ Method `next()` to get next result of type `QueryResult`:
    - ➜ `identifier`: UID of full document (`URI`)
    - ➜ `xml`: matching document fragment (`string`)
- ➜ Method `nextBlock(in short size)`: gets next `size` results in array
- ➜ Results are living in archive
- ➜ **Cursors must be closed after usage**: `cursor.close()`

PERMISSIONS AND LOCKING

Permissions infrastructure prepared, but probably not necessary

Optimistic locking via timestamps and “dirty” entities:

- ➜ `update` compares timestamps of document to ensure that latest document was used and no other update gets overwritten.
  - ➜ Can be disabled with **forceUpdate**
- ➜ **updateRetrieve(in URI identifier)** flags entity as dirty
  - ➜ To be used if user is sure to update the entity
  - ➜ Protection against someone else trying to retrieve (and then update)
  - ➜ Dirty entities cannot be retrieved (only with **retrieveDirty**)
  - ➜ are invisble to queries (apart from **queryDirty**)
  - ➜ Next `update` unsets dirty flag

EXAMPLE

- ➜ get Archive and Identifier reference:

```
ArchiveConnection ac=ArchiveConnectionHelper.narrow(
  containerServices.getComponent("ARCHIVE_CONNECTION"));
Operational archive = ac.getOperational("userName");
Identifier ident = IdentifierHelper.narrow(
  containerServices.getComponent("ARCHIVE_IDENTIFIER"));
```

- ➜ create document structure

```
XmlEntityStruct struct = new XmlEntityStruct();
struct.xmlString = "<ex>example</ex>"; // fill the rest, too
```

- ➜ get an ID:

```
containerServices.assignUniqueEntityId(struct);
```

- ➜ store document structure

```
archive.store(struct);
```

- ➜ retrieve document

```
XmlEntityStruct struct = archive.retrieve(id);
```

ADVANCED UID USAGE:

UID ranges: fetch range one time, get UIDs many times

➜ Java and C++ libraries running **inside** your components

➜ A UID range object is an XML document itself, stored in the Archive and has `X0` as local part.

➜ get a range from `ARCHIVE_IDENTIFIER`:

```
Range idRan = new Range(ident.getNewRange());
```

➜ assign UIDs:

```
ran->assignUniqueEntityId(xmlEntity);
```

➜ Assigning references: Fetch given range from Archive. It is *locked*: no UIDs can be assigned, only references to documents:

```
URI rangeUid = idRan->rangeId();
Range refRan = new Range(
        ident.getExistingRange(rangeUid, "subsystem name"));
Xmlentity entityRef;
refRan.assignUniqueEntityRef(entityRef);
```

COMMAND LINE TOOLS: All use dbConfig file

- `tomcat [start|stop|status]`
- `archive [start|stop]`
- `archiveLoadSchema -[ucl] [file|directory]`
  - `c`: Clean database first (removes **everything**). **BUG!**
  - `u`: Update schemas already stored. **BUG!**
  - `l`: Load from an `INTLIST`
  - In the moment: use no command line parameter to avoid bugs in `archiveLoadSchema`
- `archiveQuery [-i] [-q XPathQuery schemaName [-w fileName]] [-x UID]`
  - Returns full (`-x`) or UIDs (`-q`) of matching documents
  - Many symbols in queries have to be escaped: `/`, `"`, `'`, blanks
- `archiveCleanTest`:
  Deletes all data from database **if** in test mode.

Most tools display help when no parameter given

Web resources:

- Archive Twiki home:
  `almasw.hq.eso.org/almasw/bin/view/Archive/WebHome`
- Release notes:
  `almasw.hq.eso.org/almasw/bin/view/Archive/ReleaseNotes`
- UID ranges:
  `almasw.hq.eso.org/almasw/bin/view/Archive/RangeUidUsage`
- Archive tutorial: `almasw.hq.eso.org/almasw/pub/Archive/ArchiveTutorial/archive-tutorial.html`
  Old and not updated, but contains overview of functionality
- Command line tools:
  `almasw.hq.eso.org/almasw/bin/view/Archive/ArchiveSwDocs`
  Under construction, not much usefull info there yet