Digital Libraries

Repositories

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Repositories

Definitions

A ***repository*** is any computer system whose primary function is to store digital material for use in a library.

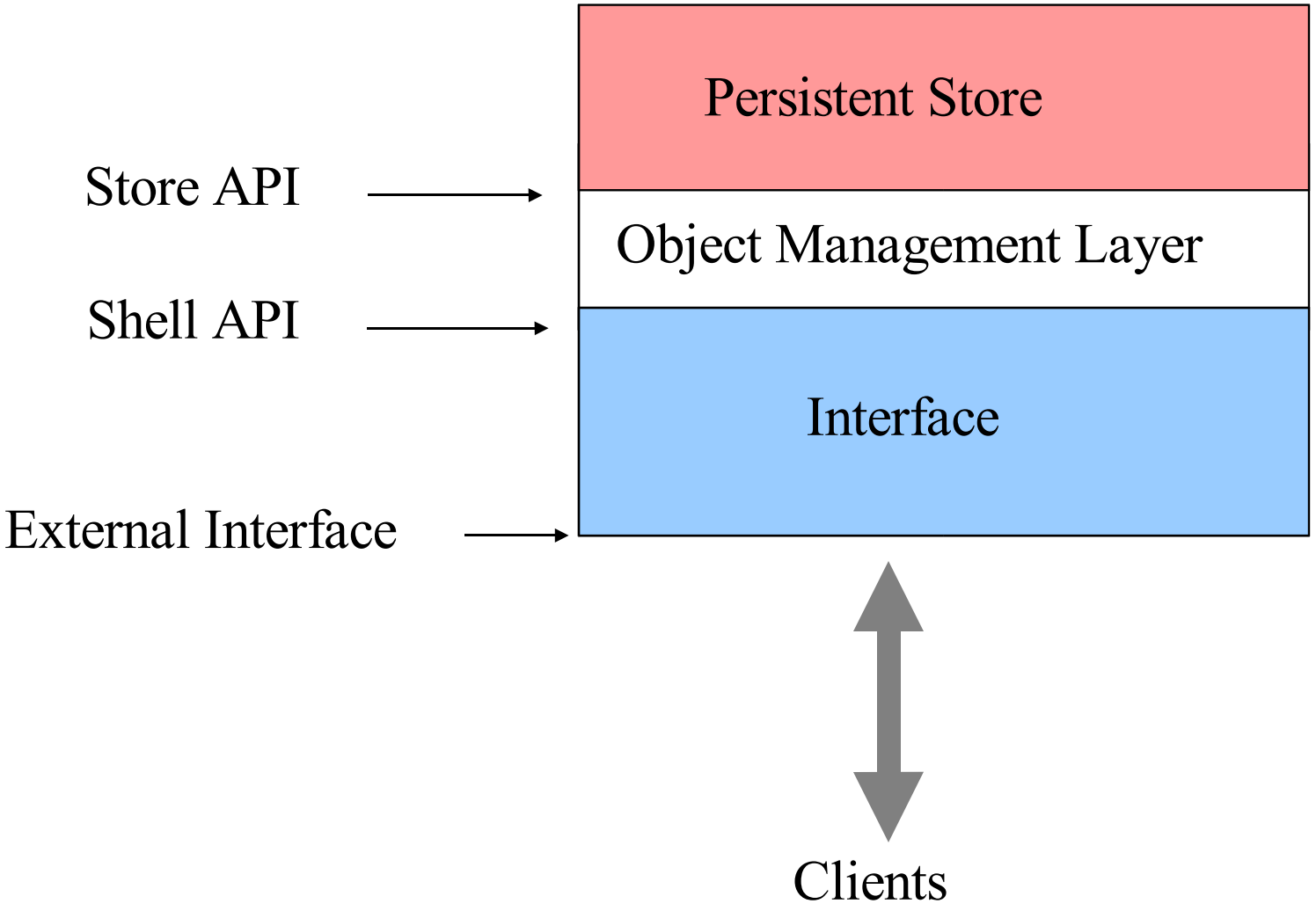
An ***archive*** is a repository that is organized to emphasize the long-term preservation of information.

Requirements 1

Information hiding

Internal organization should be hidden from client computers.

Repository layers and interfaces



Requirements 2

Object models

- Support for a flexible range of object models.
- Few restrictions on data, metadata, external links, and internal relationships.
- New categories of information do not require fundamental changes to other aspects of the digital library.

Multiple disseminations

Client can access a choice of forms of digital object:

- Format -- PDF or HTML
- Performance -- 8 bit/pixel or 24 bit/pixel color
- Content -- thumbnail, medium-resolution, high-resolution

Repository might store alternative disseminations or derive them when requested.

Dynamic content

Dissemination is produced by executing code at time client makes request

- Real-time sensor, e.g., traffic camera, satellite picture
- User characteristics, e.g., location, user profile
- Dissemination is intrinsically dynamic, e.g.,

  simulation

  virtual reality

  computer program

  Java applet

Metadata

Metadata can be linked to digital object:

- external catalog or index
- embedded in the digital object
- generated at run time

Granularity of metadata

- collection of digital objects
- digital object
- element of digital object

Requirements 3

Open protocols and formats

- Clients use well-defined protocols, data types, and formats.
- Architecture must allow incremental changes of protocols.

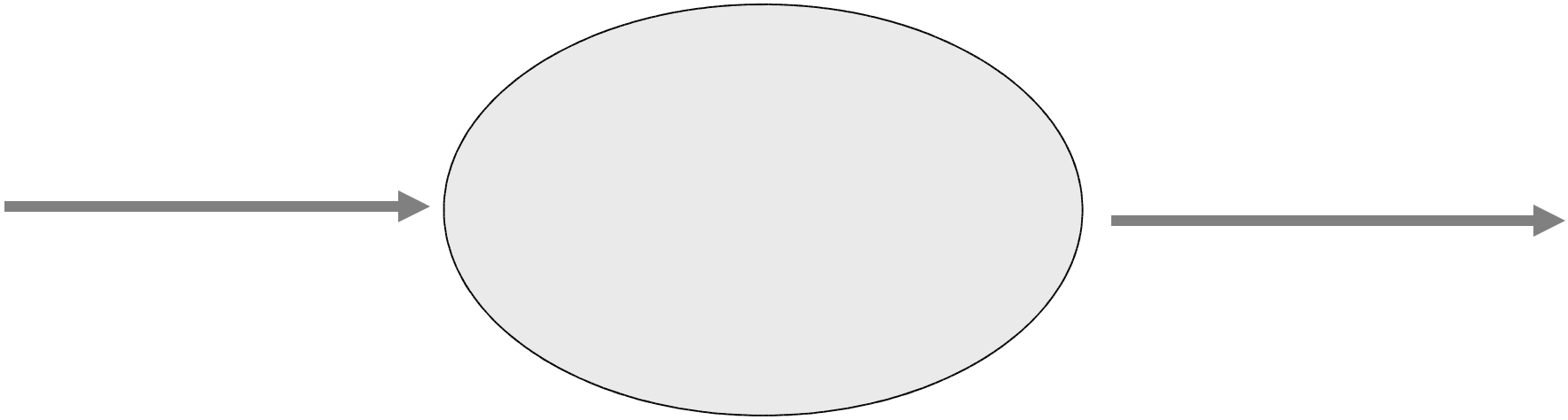
Access management

- Allow a broad set of policies
- All levels of granularity
- Prepared for future developments.

Reliability and performance

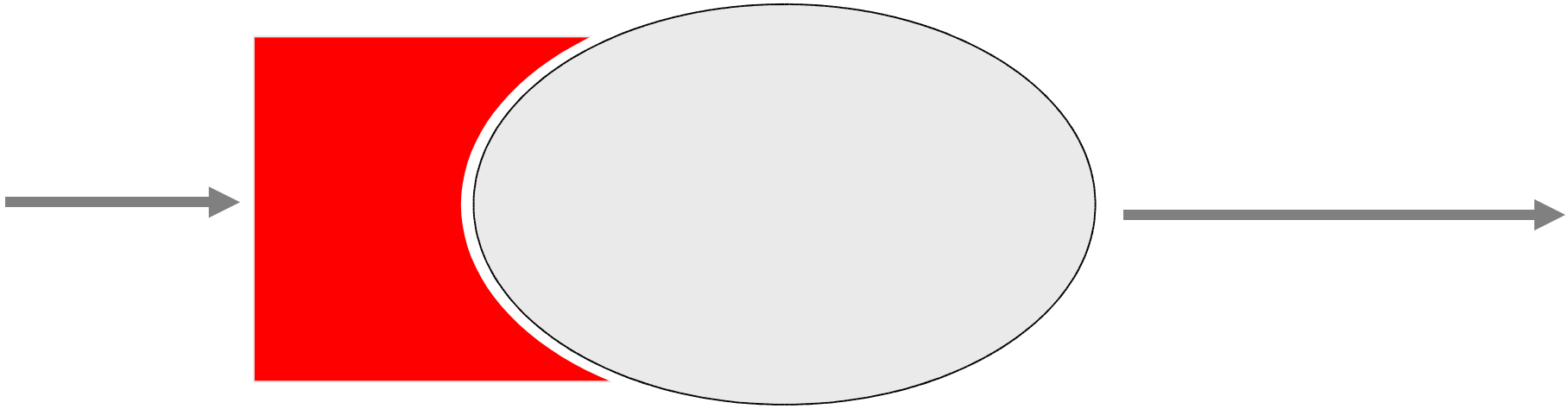
- Very large volumes of data
- Absolutely reliable in retention of data
- Good performance

Repository systems

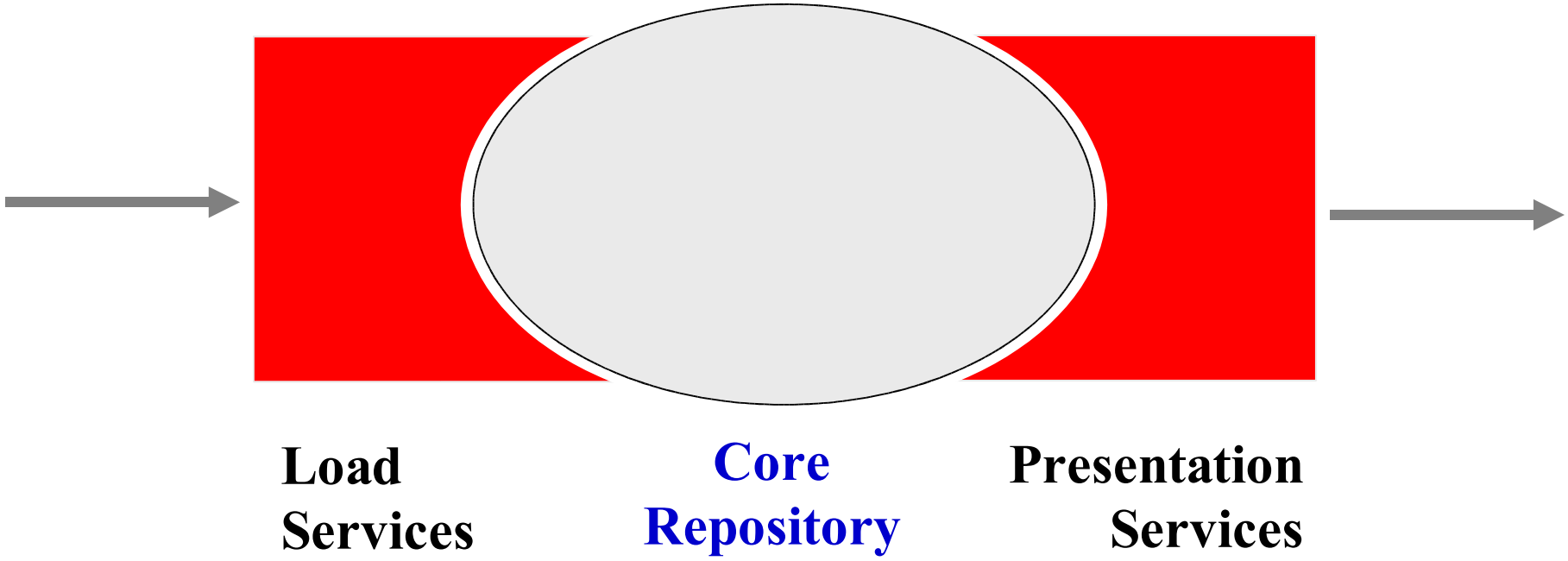


Core Repository

Repository systems



Repository systems



Common repository systems

Web server

- File-based object model plus hyperlinks
- Good tools for access
- Weak on long-term preservation

Relational database

- Table-based object model -- schema and data dictionary
- Good tools for data management
- Used for long-term preservation in data processing

Dumb and smart objects

Smart repositories objects

- behaviors provided by the repository
- e.g., relational database

Smart clients

- behaviors provided by the client
- e.g., web server

Smart objects

- repository is very simple
- digital objects provide their own behaviors
- compare with object-oriented programming (data + code)

Example: CNRI repository

Dumb repository for access to digital objects

- All information stored as **typed data** in **digital objects**.
- A single digital object has both **data** and **metadata**.
- Identification of digital objects is by location independent, persistent **URNs**.
- **Access** controls built into methods for accessing digital object.

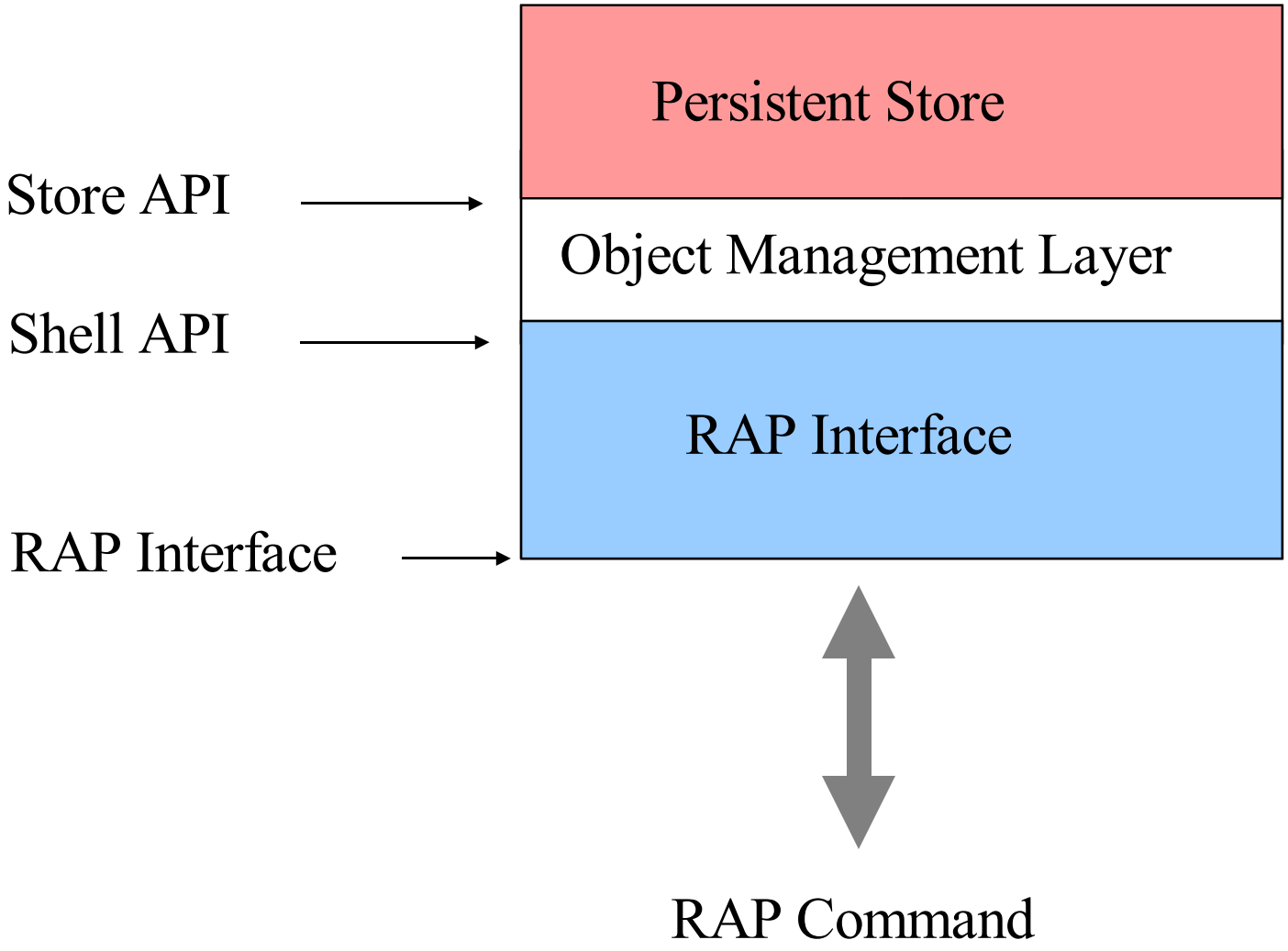
Repository Access Protocol (RAP)

RAP is a simple protocol with two main groups of commands:

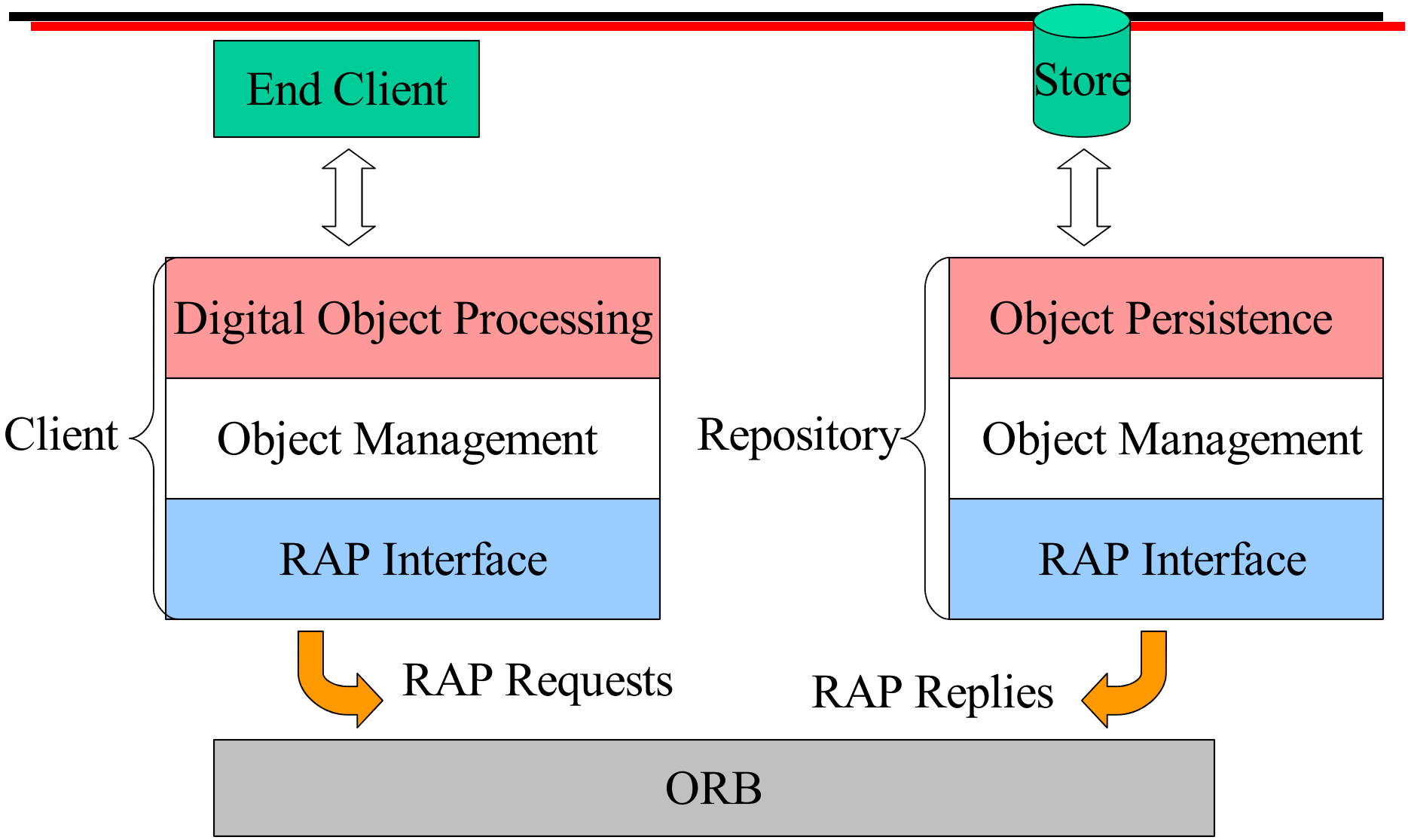
- Deposit digital object
- Verify digital object
- Delete digital object
- Edit digital object

- Access digital object
- Access metadata

Repository layers and interfaces



Client and repository architectures



Components

Hardware

- Repository: Sun Sparc with Solaris or IBM RS/6000 with AIX.

Software

- Communications: CORBA/IIOP distributed object system.
- Repository shell and object management layer: CORBA and Python.
- Persistent store: Unix file system, Oracle, Shore.
- Client: CGI scripts, Java applets.