Persistent identifiers:

jNBN, a JEE application for the management of a national NBN infrastructure

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Persistent identifiers

**Purpose:** the association of a Persistent Identifier (PI) to a digital resource can be used to certify its content authenticity, provenance, managing rights, and to provide an actual locator.

**Reliability:** the actual persistence of identifier systems can only be achieved through the commitment of the organizations that assign, manage, preserve and resolve the identifiers.

**User communities:** the existing user communities differ by technologies and implemented registries → Digital Object Identifier (DOI), Archival Resource Key (ARK), Handle System, URN, PURL, etc.

No general agreement has been reached among the different user communities.
Requirements

In our view the problem can be tackled with a hierarchical distributed approach BUT a credible solution should be:

**Policy-based**: the organisations managing the identifiers must sign and commit to a well-defined and binding policy.

**Open**: it should be based on open standards and technologies.

**Interoperable**: it should provide mechanisms to keep record of other identifiers assigned to the associated resource.

**Easy to use**: It should be easy an ID to the corresponding resource.
National Bibliography Number

National Bibliography Number (NBN) is a Universal Resource Name (URN) namespace under the responsibility of National Libraries.

**Adoption:** the NBN namespace, as a Namespace Identifier (NID), has been registered and adopted by the Nordic Metadata Projects upon request of the CDNL and CENL.

**Current limitations:** URNs are not directly actionable (i.e. browsers generally do not know what to do with a URN), because they have no associated global infrastructure that enables resolution (such as the DNS supporting URL).
Management

• A **Steering Committee** for experimental activity management has been established, where BNCF, BNCR, CNR, FRD, ICCU, ASI are represented.

• The board defines the **structure of the Italian NBN testbed** (domain hierarchy) and the **policies for infrastructure management**, sub-domain creation/removal and PI assignment.
The NBN initiative in Italy 2/2

Software

• The Italian National Research Council (CNR) and Fondazione Rinascimento Digitale (FRD) worked together to define the requirements and features of a software for the management of a distributed hierarchical NBN infrastructure.

• The Italian National Research Council (CNR), leveraging internal human resources and facilities, developed the software.

• CNR is currently responsible for the software development and license.
Objectives

1. Define and propose methodologies, tools and policies for the management of a national stable, trustable and certified NBN register of digital objects to be adopted by cultural and scientific communities.

2. Allow an easier and wider access to the digital resources produced by Italian cultural institutions, including digitised or not yet published material; encouraging the adoption of long term preservation policies.

3. Develop an inter-domain resolution service (e.g., NBN:IT ↔ NBN:DE) with a common meta-data format and a user-friendly interface (pre-condition for global resolver).

4. Implement some ‘accounting’ mechanisms to be leveraged in the production of statistics about scientific publications and works.
Key points

“Trustability” model
The “trustability” of the whole system relies on a binding policy that all participating agency MUST sign in order to join the infrastructure.

Sustainable approach
Distributed responsibility and functionalities can overcome the limitations imposed by a centralised system and split up the management costs among several partners, while preserving the authoritative control.

Robust infrastructure
Redundant mechanisms must be implemented to ensure high availability of the service (data duplication, multiple service entry points, …).
Policy

The trustability and reliability of an NBN distributed infrastructure can be guaranteed only by defining and enforcing effective policies.

To this end the steering committee for NBN experimental activities in Italy is going to release a common policy, that will have to be signed by all the participating agencies, which will include:

a) Organisational requirements

b) Technical requirements

c) Guidelines for ID management
Distributed approach

At the highest level there is a root or central node (CN), which is responsible for the top-level domain (IT in our case). The root node delegates the responsibility for the different second-level domains (e.g.: IT:UR for University and Research) to second-level naming authorities.

Sub-domain responsibility can be further delegated using a virtually unlimited number of sub-levels (e.g.: IT:UR:CNR, IT:UR:UNIMI, etc.). The intermediate sub-domains are managed by the so-called inner nodes (IN).

At the bottom of this hierarchy there are the leaf nodes (LN), which are the only ones that harvest publication metadata from the actual repositories and assign unique identifiers to digital objects.

Each agency adheres to the policy defined by the parent node and consistently defines the policies its child nodes must adhere to.
Architectural elements

Central Node (CN)

1. manages the NBN:IT domain both for national and international issues.
2. registers sub-domains for institutions that accomplish a registration procedure.
3. harvests second level nodes and maintains the central register, where all NBN names generated by any leaf nodes are stored.
4. checks the NBN records harvested from sub-domain registers for policy compliance and uniqueness.
5. resolves user-queries directly or redirect them to the appropriate lower level agency.
6. manages cross-requests for names belonging to other NBN national domains or to DOI namespace, providing a minimum set of common metadata.
Architectural elements

**Inner Node (IN)**

The architecture defines the IN in order to manage specific sub-domains which control other lower level domains (as NBN:IT:UR).

a) The Inner Agencies can define their own policies for NBN name generation or sub-agency registration, which apply to their specific domains (e.g., Cultural Heritage, Scientific, Broadcasting, etc.).

b) The INs harvest the NBN records from the leaf and/or inner nodes under their responsibility and perform checks that are similar to those described for the central node but for a smaller set of resources.

c) The INs **cannot generate NBN names** but can resolve them directly or by redirecting requests to the appropriate nodes.
Architectural elements

Leaf Node (LN)

The LNs are responsible for the bottom-level sub-domains, which are assigned to the agencies that manage the actual digital libraries.

a) They harvest digital resources from the repositories under their responsibility and generate resource names on operator’s demand.

b) Each LN can resolve NBN names directly or by redirecting requests to the appropriate nodes.
Resolving NBN names

Central Node NBN:IT

Resolution request
NBN:IT:XX:YY:1234

NBN:IT:XX

NBN:IT:YY

NBN:IT:XX:ZZ

NBN:IT:YY:HH

NBN:IT:YY:KK

NBN Leaf Reg
Technologies

- Technology platform: Java Enterprise Edition
- AJAX Framework (user Interface): zKoss
- Development Framework: JADA®
- OAI-PMH library: OCLC
Tools and platforms

• Application server: JBOSS
• DBMS: Postgres
Development Infrastructure

- Versioning: Subversion
- Change Request Management: Bugzilla
- Development Statistics: StatSVN
User profiles

• Administrator: configure node.

• Operator: triggers NBN assignment.

• Registered User: queries registry, access categorized view.

• Public User: queries registry.
Features

- Resource and metadata retrieval
- Resolution request forwarding
- Scheduled metadata harvesting
- Triggered NBN assignment
- Ubiquitous name resolution
- Duplicate check
- Supported metadata schemata: Dublin Core, Mets.
Simple search
Metadata
The isometric deformability question for constant mean curvature surfaces with topology

Brian Smyth    Giuseppe Tinaglia
March 28, 2008

Abstract

The paper treats the isometric deformability of non-simply-connected constant mean curvature surfaces which are neither assumed embedded nor complete. We prove that if a smooth oriented surface $M$ immersed in $\mathbb{R}^3$ admits a nontrivial isometric deformation with constant mean curvature $H$ then every cycle in $M$ has vanishing flux and, when $H \neq 0$, also vanishing torque. The vanishing of all fluxes implies the existence of such an isometric deformation when $H = 0$. Our work generalizes to constant mean curvature surfaces a well-known rigidity result for minimal surfaces (see for instance [4]).
Login
Administrator home

- Search mask
- Categories
- Node State
- List of other known nodes
- External node info
- Schedule manager
User management
Testbed configuration

Architecture
- central node at BNCF and duplicated at BNCR, responsible for the Italian NBN:IT, generating and managing all the sub-domains, guiding the resolution service for Italy and the international coordination;
- a second level inner node at CNR, responsible for a sample thematic sub-domain (NBN:IT:UR); a third level leaf node responsible for the local NBN:IT:UR:CNR
- a third level leaf node at UNIMI, responsible for the NBN:IT:UR:UNIMI
- a second level leaf node at FRD, responsible for the local NBN:IT:FRD

Functions
- distributed name generation for digital resources
- uniqueness and authenticity certification for generated names
- armonisation of policies among different user communities
- distributed capacity to resolve the association name-metadata-resource
Italian testbed

Central Node URN:NBN:IT

Level 1

NBN:IT:UR

NBN:IT:UR:CNR

Level 2

NBN:IT:UR:Biblioteca

Level n

NBN:IT::UR:CNR:centro

Level n +1

NBN:IT::FRD

trusted digital repositories

Metadata + Resources URL

“Network Humanitas” GARR Conference
Napoli 1/10/2009
Lessons learned

- Distributed hierarchical approach is viable.
- PI uniqueness check can be performed by comparing the digital fingerprints of the resources with some limitations:
  - the fingerprint must be calculated at the digital repository level and included in the “harvestable” metadata;
  - MD5 fingerprint allows detecting only exact duplicates.
Future steps

• Software development …

• Implementation of new functions such as ‘accounting’, better duplicate detection, …

• Enlargement of the Italian network

• DOI interoperability

• Field experience of our software in other countries (Czech Republic)

• Interoperability with NBN systems deployed in other countries for cross-domain name resolution.
External node info
Node info
Schedule

- **Name**: Every hour
- **Last Executed**: 26-giu-2009 17.54.00
- **Rule**: Every Hour

**Tipo**

- Name: Every hour

**Valore**

- Every Hour
- Each 3 Hours
- Each 6 Hours
- Each 12 Hours
- Each 24 Hours

**Role**

- Select nodes that must be synchronize
- IT:UR
## Repository listing

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<thead>
<tr>
<th>NBN:IT:UR:CNR:37</th>
<th>URL</th>
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<th>State</th>
<th>Flag</th>
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<td>withdrawn</td>
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