DESIRE II LDAP Indexing System and Metadata Enhanced Web Indexing

Desire II

Web Indexing Workshop

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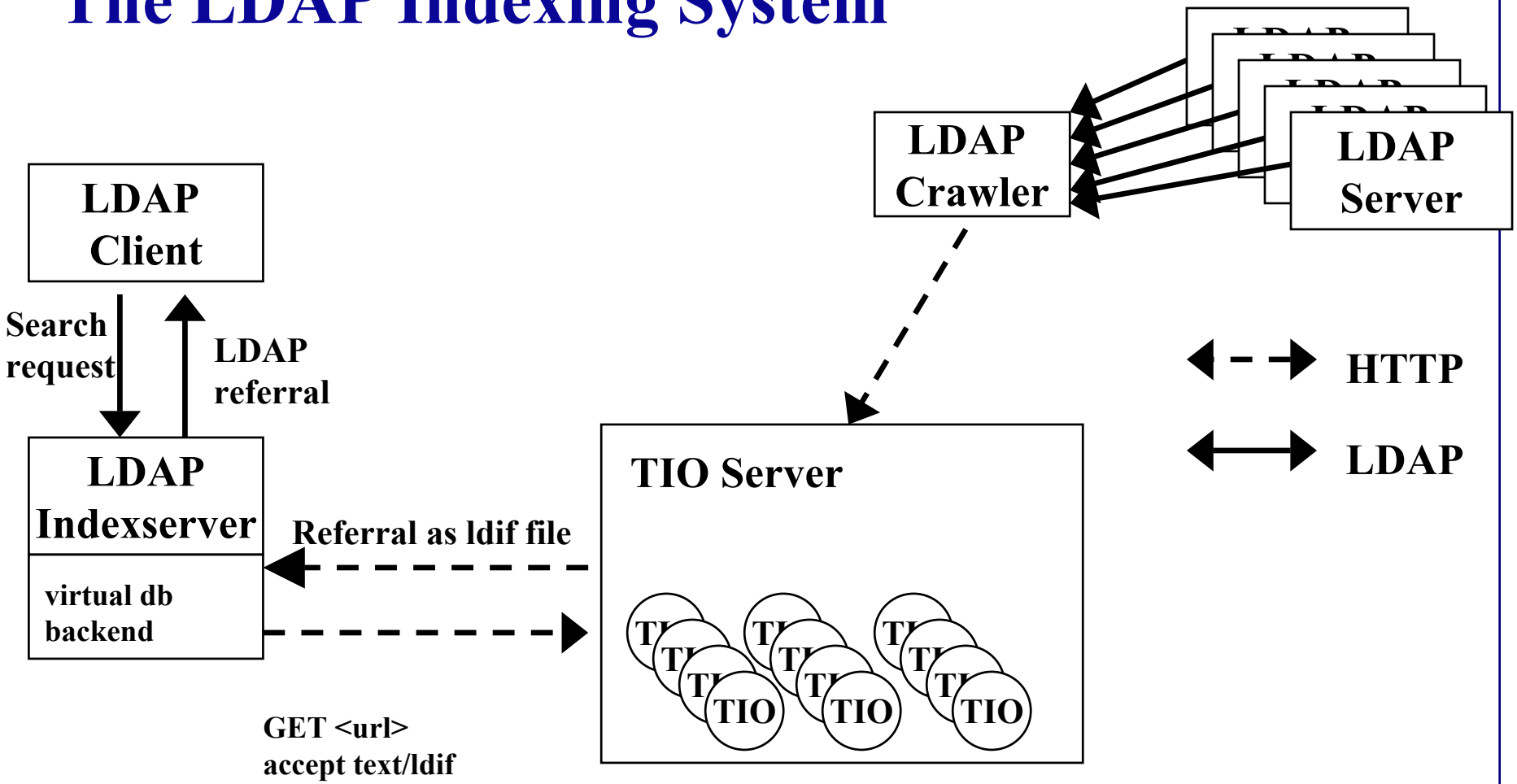
I. The DESIRE II Indexing system

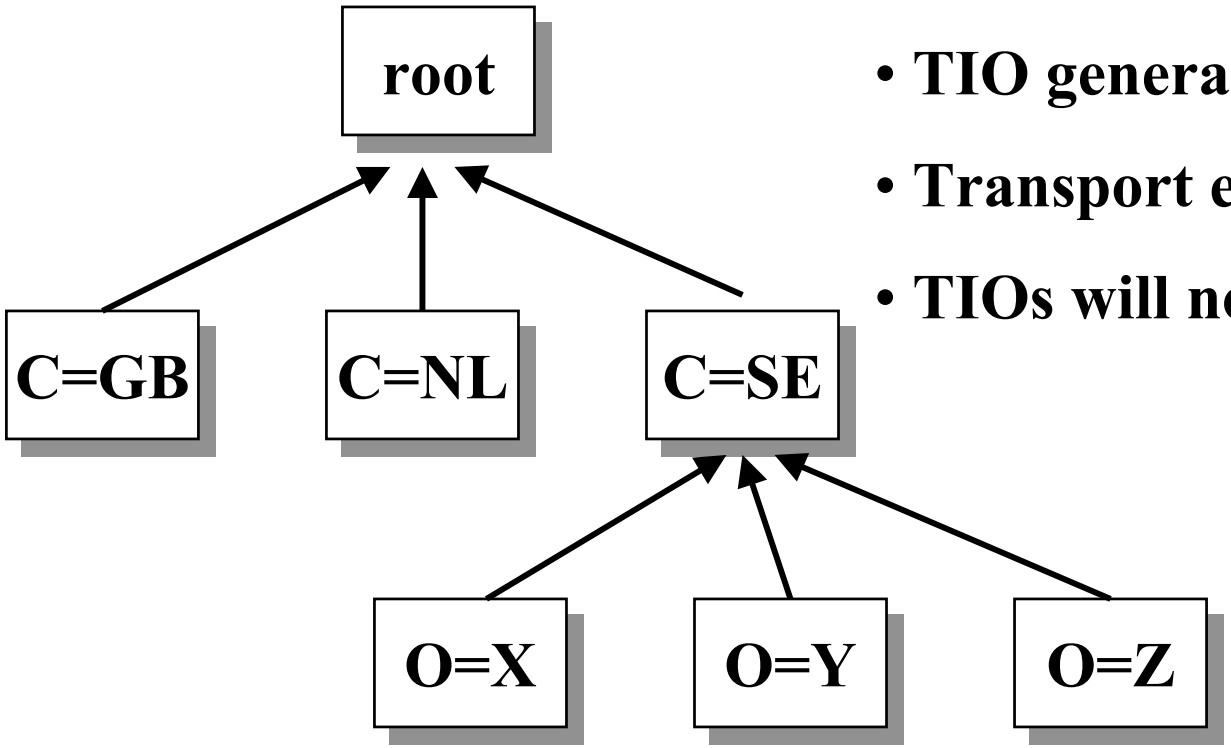
Distributed Index system

- Hierarchical topology
- LDAP v3 technology
- Managed by the server side
- Index server registration
- Subset of CIP
  - Dataset Identifier (DSI)
  - Base URI for generating referrals
- Usage of the Tagged Index Object (TIO)
  - Tag identifies common attributes of an entry

The LDAP Indexing System

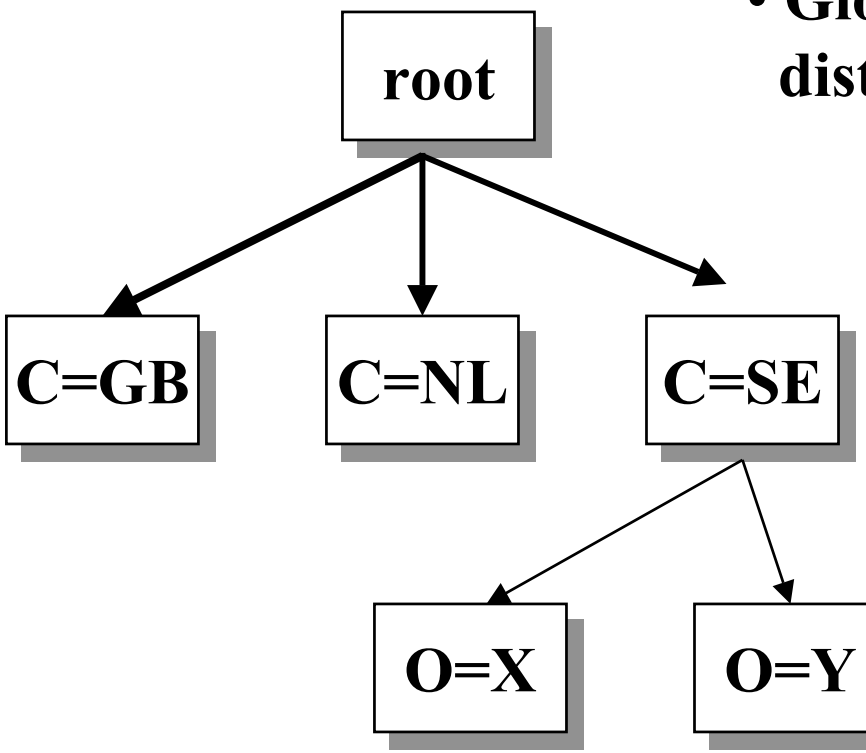


Index Gathering



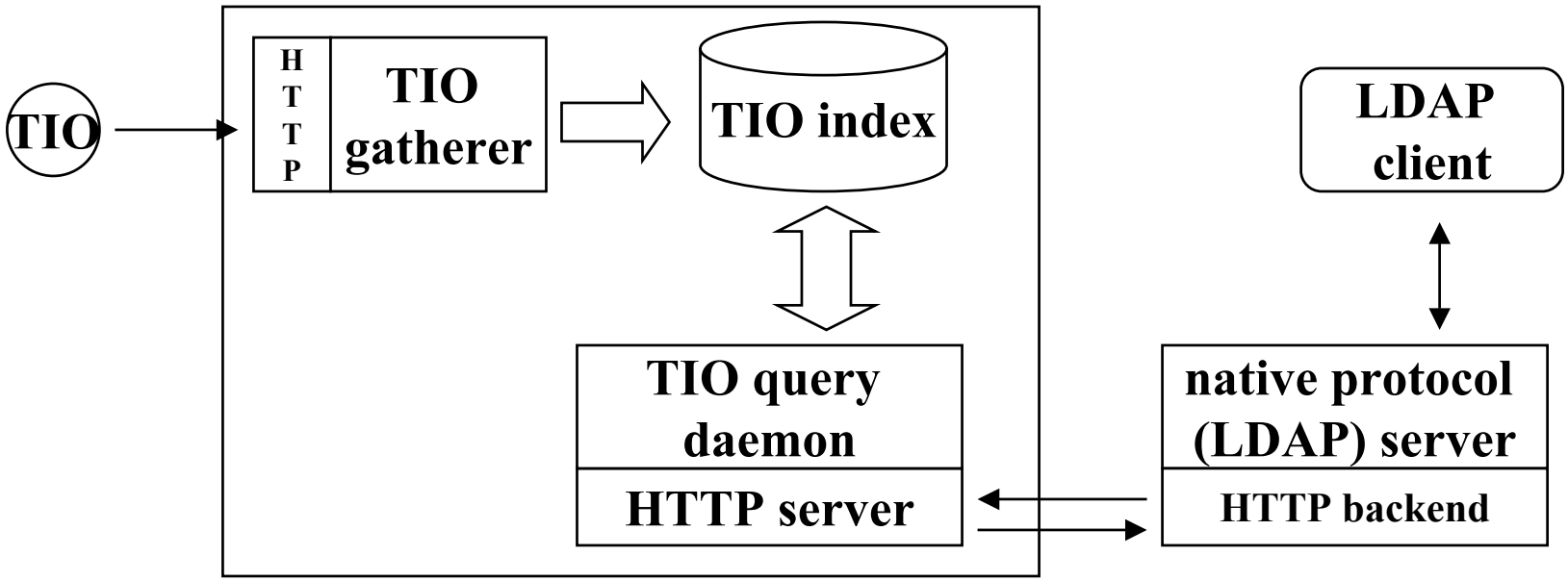
- TIO generated by crawlers
- Transport encrypted via HTTP
- TIOs will not be aggregated

Index Distribution



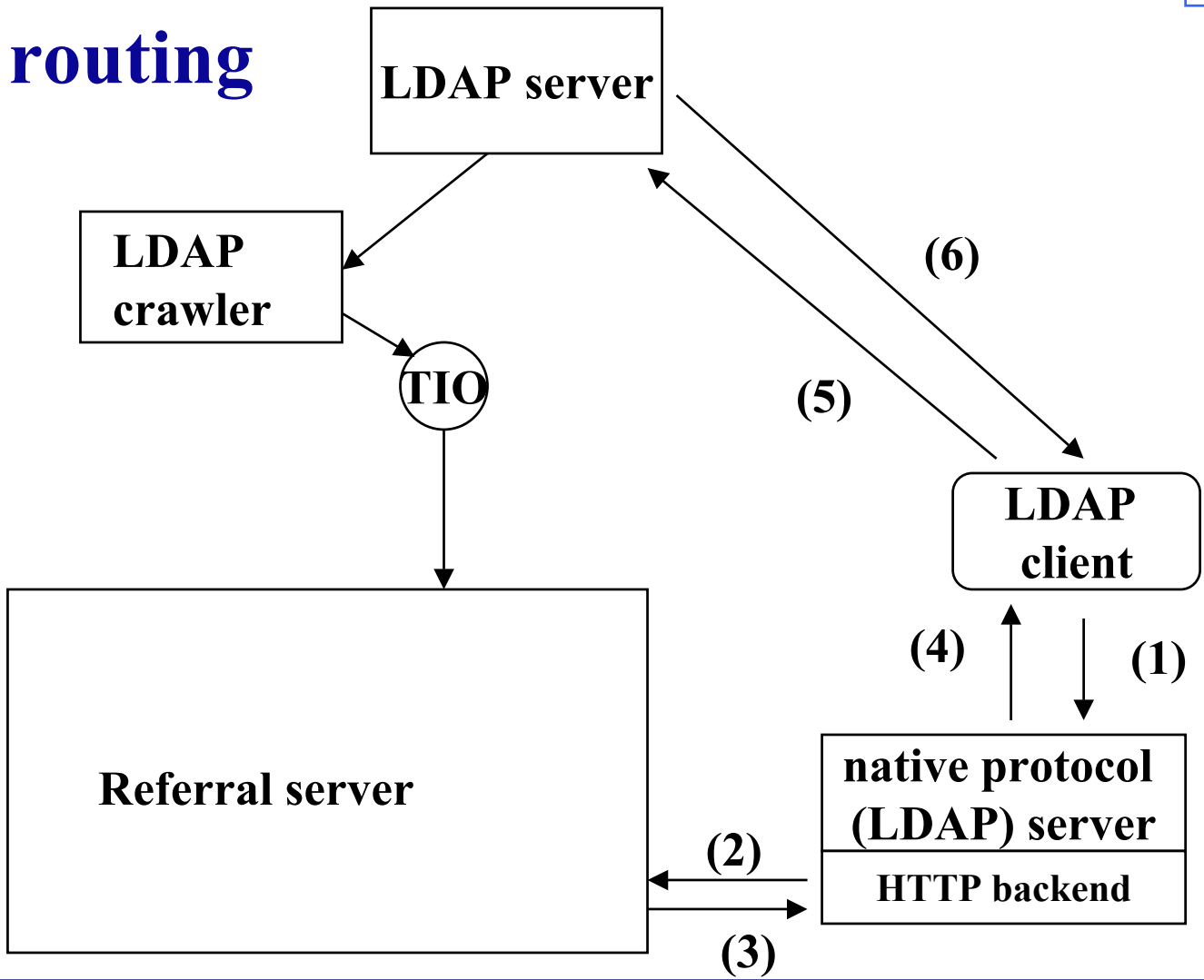
- Global TIO collection distributed to country level
- Country index can be distributed downwards
- Transport encrypted via HTTP

Referral Server Architecture



Http request: GET ldap://hostport/c=nl??sub?(cn=*pers*) Accept:text/ldif
Http response: Content-Type:text/ldif dn:ref=ldap://host/o=abc,c=nl

Query routing



Security Requirements

- Personal Data are subject to privacy legislation
- Public data have different status in collections
- We don’t want to serve spammers
- Participating applications should be known

Security Solutions

- All Index objects will be encrypted while on the net
- PGP encrypted S/MIME RFC 2015
  - Transport protocol independent
- Data server registration
- Crawler policy stored in the data server
- Crawler registration
- Referral Server will give back a limited amount of referrals

Current State

- **Implementation ready:**
  - **LDAP crawler that outputs LDIF and starts a LDIF2TIO converter and a MIME wrapper to send the TIO to the TIO index server**
  - **HTTP Server with SQL database to store and retrieve TIO information**
  - **TIO-backend for the openLDAP SLAPD that queries the TIO server**
  - **LDAPv3 client**
- **A ad hoc working group is about to define a CIP/TIO based service, which will include:**
  - **This DESIRE II implementation**
  - **TISDAG implementations**
  - **Implementation by Catalogix**

II. Usage for metadata enhanced web indexing

Requirements for a distributed metadata index

- Data maintained decentral
- Variety of metadata formats
  - DC, MARC, SOIF, GILS
- Variety of representation of metadata formats
  - RDF, RDM, LDIF, HTML-header
- Publishing of schemas via metadata registries
- Conversion of XML based schemas to LDAP (DSML)
- LDAP schemas for the metadata formats
- CIP and TIO

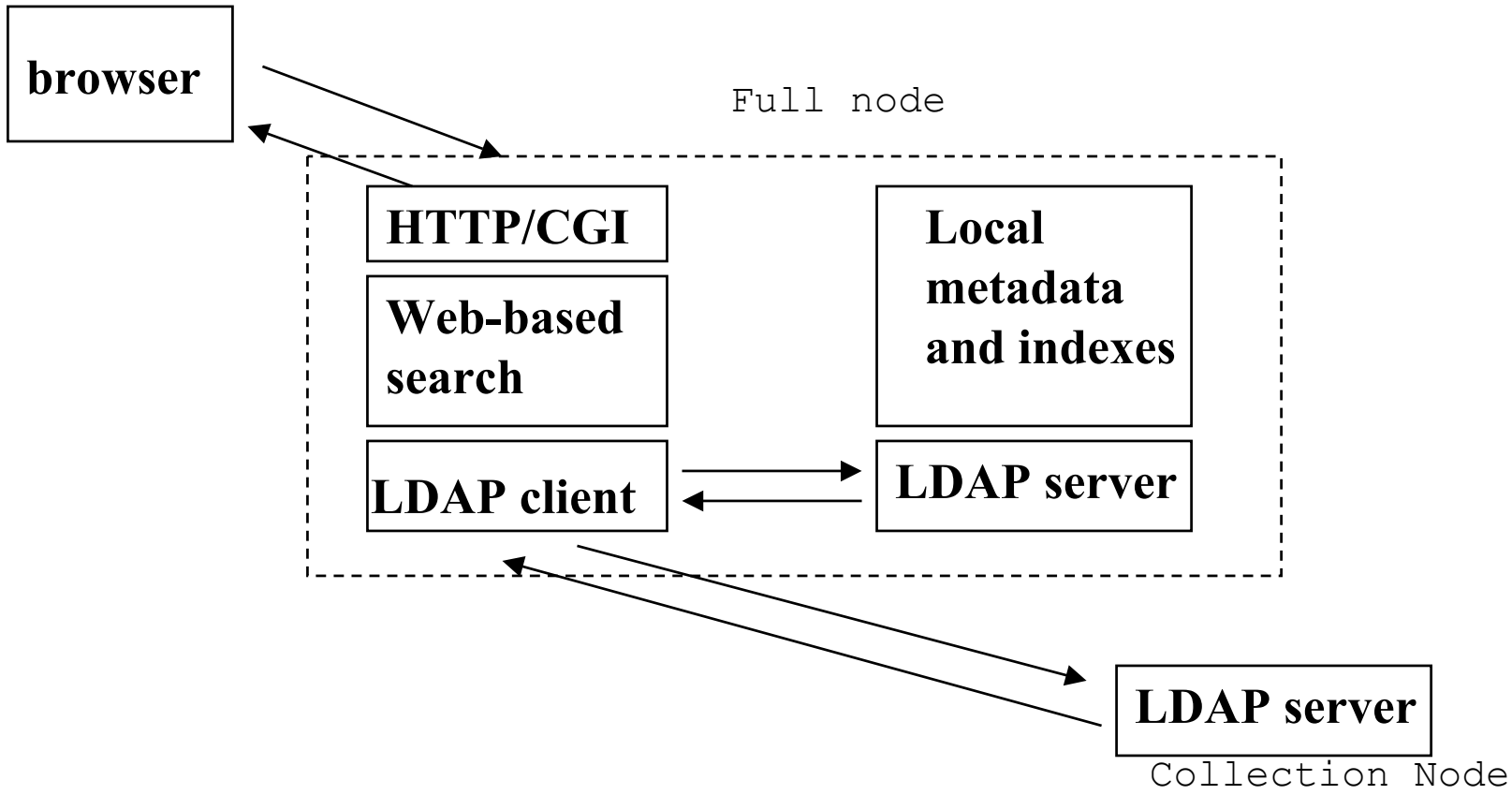
Existing LDAP based metadata projects

- **Isaak Network**
- **Imesh**

Isaac Network of the Internet Scout Project

- Current status unknown
- Distributed architecture for resource discovery using metadata
- Metadata standard DC as common base
- Metadata repository based on LDAP servers
- Indexing service based on CIP with TIO
- Search interface web based (HTTP/HTML)
- Includes a Whois++ Gateway to include ROADS based information

Isaak Project (contd.)



IMesh Toolkit

- UK/US Project on distributed subject gateways (SG)
- Sept. 1999 - August 2002
- Aims are:
  - Develop overall framework for SGs
  - Framework for interoperating between various SGs
  - Create favorable environment for implementing systems and services
- Specific objectives:
  - Subject gateway architecture, APIs, tools for SG management
  - Integrated development environment for metadata
  - Metadata registry

Imesh (contd.)

- Conversion between different metadata formats (DC, MARC, ROADS/IAFA)
- Support for different retrieve protocols (LDAP, Whois++, Z39.50)
- Forwarding of knowledge via CIP using the TIO

DSML (Directory Service Markup Language)

- Means for representing directory information as an XML document
- Directory enhancement for XML based applications
- Similiar XMLDir from Novell used as Data interchange format
- Can be used to convert RDF data to directory data
- A DSML document can describe:
  - directory entries
  - directory schema
  - both

DSML Example

```
<dsml:dsml xmlns:dsml="http://www.dsml.org/DSML">
<dsml:directory-schema>
<dsml:class id="person" superior="#top" type="structural">
   <dsml:name>person</dsml:name>
   <dsml:description>objectclass for Person</dsml:description>
   <dsml:object-identifier>2.5.6.6</dsml:object-identifier>
   <dsml:attribute ref="#cn" required="true"/>
    ...
   <dsml:attribute ref="#description" required="false"/>
    ...
</dsml:class>
```

DSML Example (contd.)

```
<dsml:directory-entries>
<dsml:entry dn="cn=Damy Mahl, o=Brunel University,c=GB">
  <dsml:objectclass>
      <dsml:oc-value>top</dsml:oc-value>
      <dsml:oc-value>person</dsml:oc-value>
   </dsml:objectclass>
   <dsml:attr name="cn">dsml:value>Damy Mahl</dsml:value><dsml:attr>
 <dsml:attr name="cn"><dsml:value>Damy Mahl</dsml:value><dsml:attr>
 <dsml:attr name="mail">
     <dsml:value>damy@brunel.gb</dsml:value>
     <dsml:value>damy@xyz.com</dsml:value>
 <dsml:attr>
</dsml:entry>
</dsml:directory-entries>  </dsml:dsml>
```

TIO Index for metadata

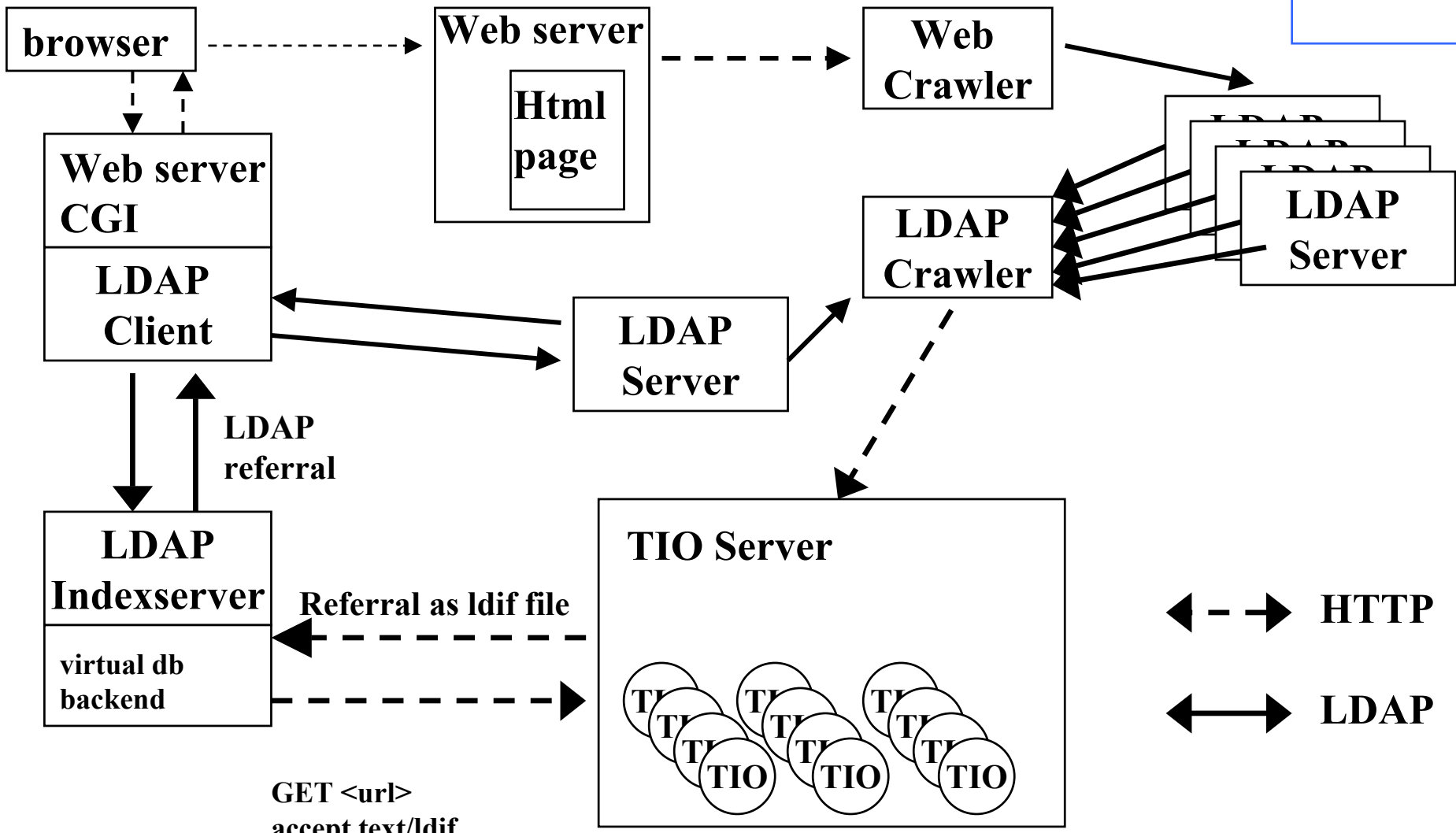
- Web crawler crawls webpages and stores metadata in local LDAP server including URI.
- XML encoded Metadata can also be stored into LDAP server
- Agent could convert other XML based metadata repositories into LDIF via DSML to include the data in the LDAP server.
- LDAP crawler crawls all LDAP servers holding metadata information, produces LDIF files and starts the following:
  - Tools convert LDIF data to TIOs (or SOIF?).
  - A MIME wrapper sends TIOs to the TIO referral server.
- Referral server stores TIOs into SQL data base.

TIO Index for metadata (contd.)

- Web based query-interface has LDAP client as backend
- Backend LDAP client:
  - Performs search at LDAP server with TIO backend.
  - Follows the referral and retrieves the data.
  - Converts the data into HTML.
- Interface displays result as hyperlinks to the indexed web page.

TIO Index for metadata

DESIRE



Partners in DESIRE II / More Information

- **Partners**
  - **SURFnet**
  - **DANTE, Cambridge**
  - **University of Brunel**

- **More Information:**
  - **http://www.desire.org**
  - **Peter.Gietz@directory.dfn.de**
  - **draft-gietz-ldapindex-00.txt**

  - **http://www.directory.dfn.de**