

# *LoDN: Logistical Distribution Network*

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September 23, 2004 - Nice, France  
WACE 2004

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**LOCI**

LOGISTICAL COMPUTING AND  
INTERNETWORKING LAB



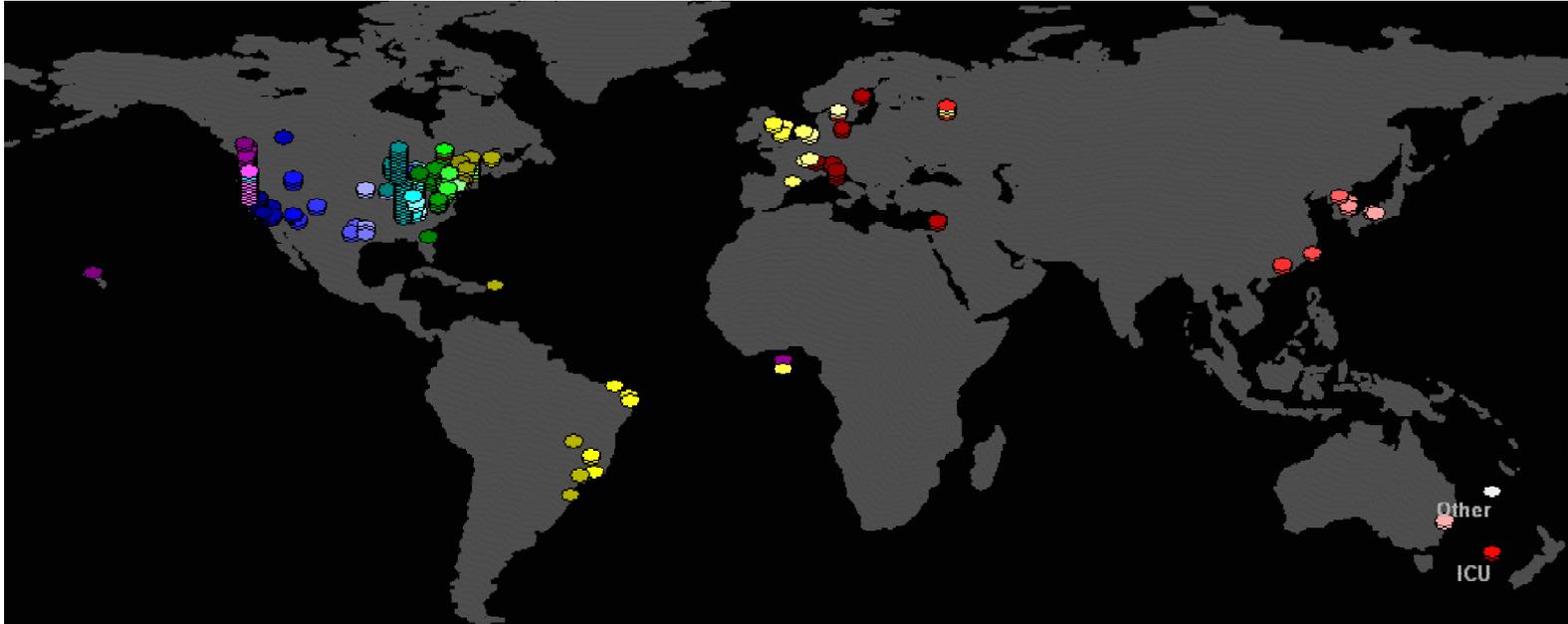
# Overview

- Introduction to Logistical Networks (LoN), and associated tools (IBP, exNode, L-Bone)
- Introducing LoDN
- How does LoDN works ?
- Conclusion/Limitations/Future works

# Logistical Network

- LoN proposes a different network storage scheme
- Highly generic, Best effort, Scalable (like IP)
- The foundational service is called IBP (Internet Backplane Protocol), a middleware for managing and using remote storage
- Stronger services are provided “end-to-end” on top of IBP (ex: extended duration, reliability, fault tolerance)

# OCI's Logistical Network



powered by   
PLANETLAB

+415 depots

+41 TB

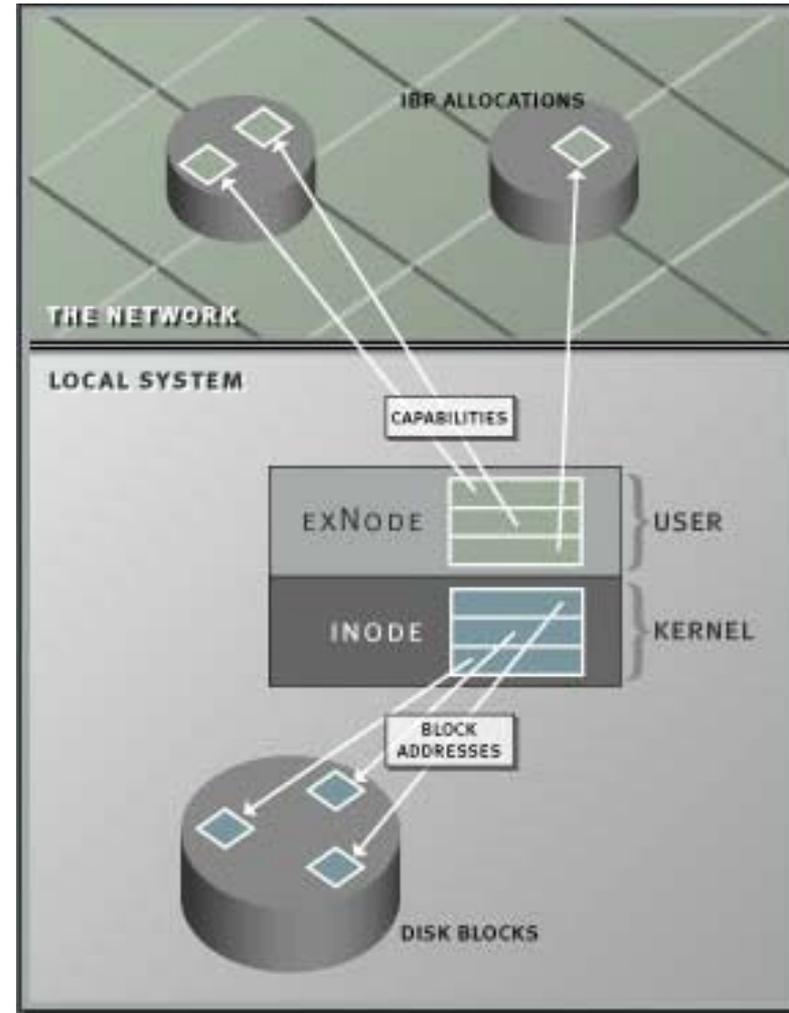
30 countries

**Storage** – as a network function

**Logistic** – matter where data is

# exNode

- XML encoded metadata file
- Holds meta data required to manage distributed content
- exNode file are stored in the LoDN server



# L-Bone: Logistical Backbone

- The L-Bone maintains a directory of IBP depots and metadata about these depots.
- The client library allows users to query the L-Bone for depots that meet certain requirements.

<http://loci.cs.utk.edu/lbone>

# LoDN overview (1/2)

Sharing data sets can be a problem when

- Exceptionally large

- In peak demand

LoDN is an experimental content distribution tool

- Store content in a Logistical Network

- Manage, Retrieve and Share data

Users can collaborate through a web portal dedicated to them



# LoDN overview (2/2)

Based on IBP and exNode designed for Logistical Network

A reliable storage thanks to duplication technics (augment)

Fast Access to the data

Fast throughput (r/w blocks of file from/to different depots)

Active management of files : “Warmer”

Simple distributed file system

Content Distribution Network

# Implementation/Requirements

LoDN is comprised of 4 elements:

- Two Java Web Start applications (storing/retrieving data)
- A web interface for:
  - Managing stored data
  - Browsing public content
- A process called the Warmer (Perl script)

## System's end-user side

Web browser  
JRE ( $\geq 1.4$ )  
Network access

## LoDN's server side

Web server (Apache)  
CGI enabled  
Network access

# Access data through a web portal

File Edit View Go Bookmarks Tools Help

http://promise.sinrg.cs.utk.edu/lodn/cgi-bin/lodn\_browser.cgi?subdir=/modis modis modland

LoDN [localhost] LoDN [promise] Calendar Server

LoDN browser NTSG Workshops

Logged in as: modis v0.2 Logout LoDN Hel

Launch Java Upload Client

OS X (click OS X if you use Mac)

...:LoDN:...  
LoCI

Current Directory:  
/modis

Operation: GO

| Filename (click for Java download)  | View | Augm. | Delete | exNode | Status |
|---|------|-------|--------|--------|--------|
| <input type="checkbox"/> MOD17A2.A2003297.Europe.GPP.105.1078982117_3200.png 🍏    | 🔍    | ✍️    | 🗑️     | 📁 📄    | ●      |
| <input type="checkbox"/> MOD17A2.A2003361.the_Globe.GPP.105.1078945271_1200.png 🍏 | 🔍    | ✍️    | 🗑️     | 📁 📄    | ●      |
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| <input type="checkbox"/> MOD17A2.A2003361.the_Globe.GPP.105.1078945271_800.png 🍏  | 🔍    | ✍️    | 🗑️     | 📁 📄    | ●      |

Operation: GO

●/●: Published/Unpublished  
📁/📄: Full/Read Only exNode  
🍏: Click the apple to download file under OS X

Create Directory  
Create

Delete directory  
Rename directory

Upload exNode  
Browse... Upload

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Done

http://loci.cs.utk.edu/lodn

# Publish and Retrieve data

Based on Java Web Start technology

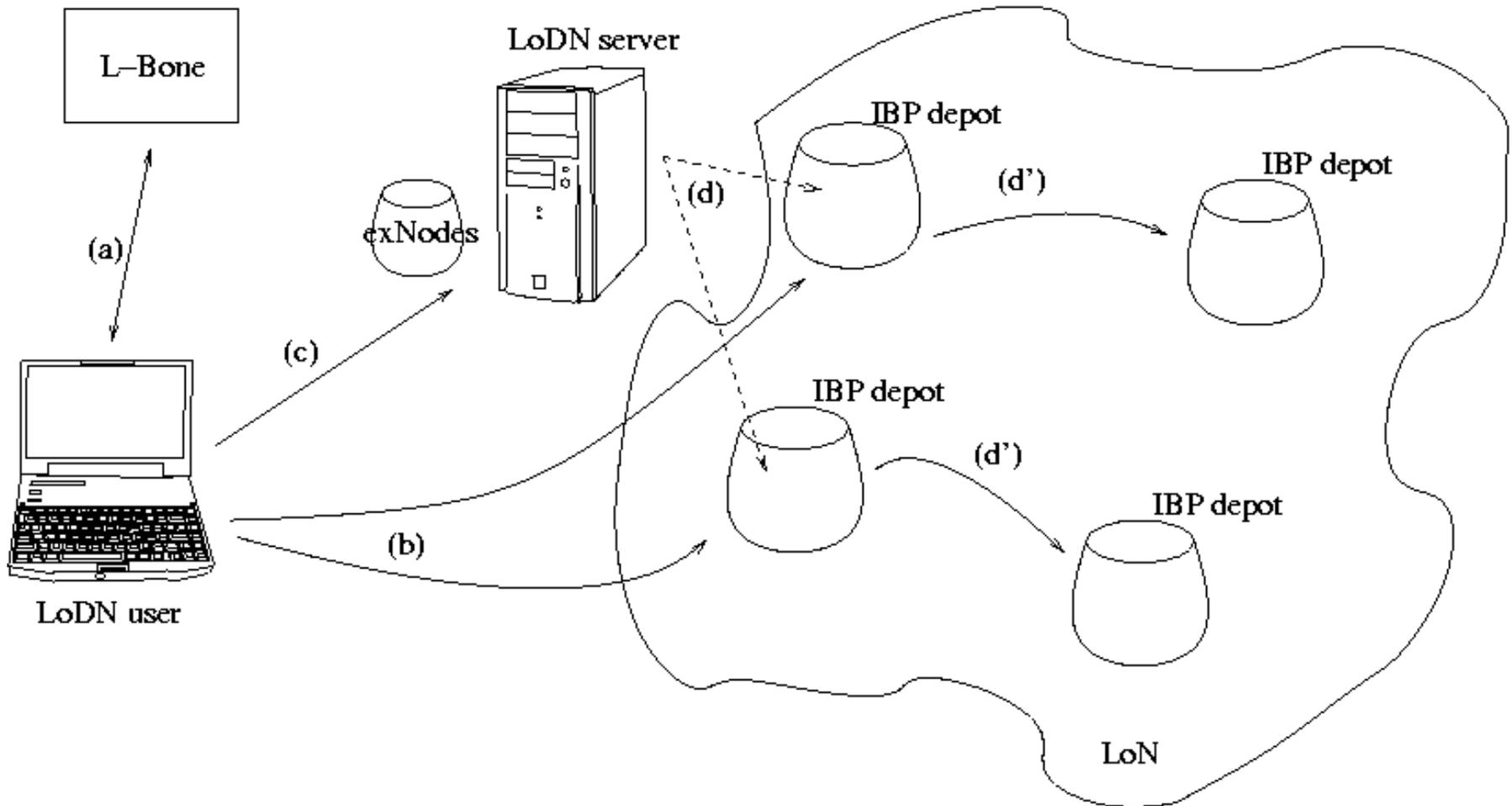
## Upload

The Upload dialog box features a menu bar with 'File' and 'Help'. It is divided into several sections: 'Input File' with a text field containing a file path and a 'Browse' button; 'Output File' with a text field containing a file path and a 'Browse' button; 'Location and Connection Type' with a 'Location type' dropdown set to 'state=', a 'Location code' text field with 'tn', and radio buttons for 'Dial-Up/ISDN', 'DSL/Cable/T1', 'less than 100Mbps' (selected), and '100Mbps and over'; 'Advanced Parameters' with 'Number of connections' (6), 'Block size' (2) with 'KB' and 'MB' radio buttons (MB selected), 'Number of copies' (2), and 'Number of depots' (5); and 'Extra services' with radio buttons for 'None' (selected), 'XOR obfuscation', 'AES encryption', 'MD5 checksum', and 'Compression'. A note box states: 'Note: These services are currently under construction. Sorry for the inconvenience.' At the bottom are 'Upload' and 'Exit' buttons.

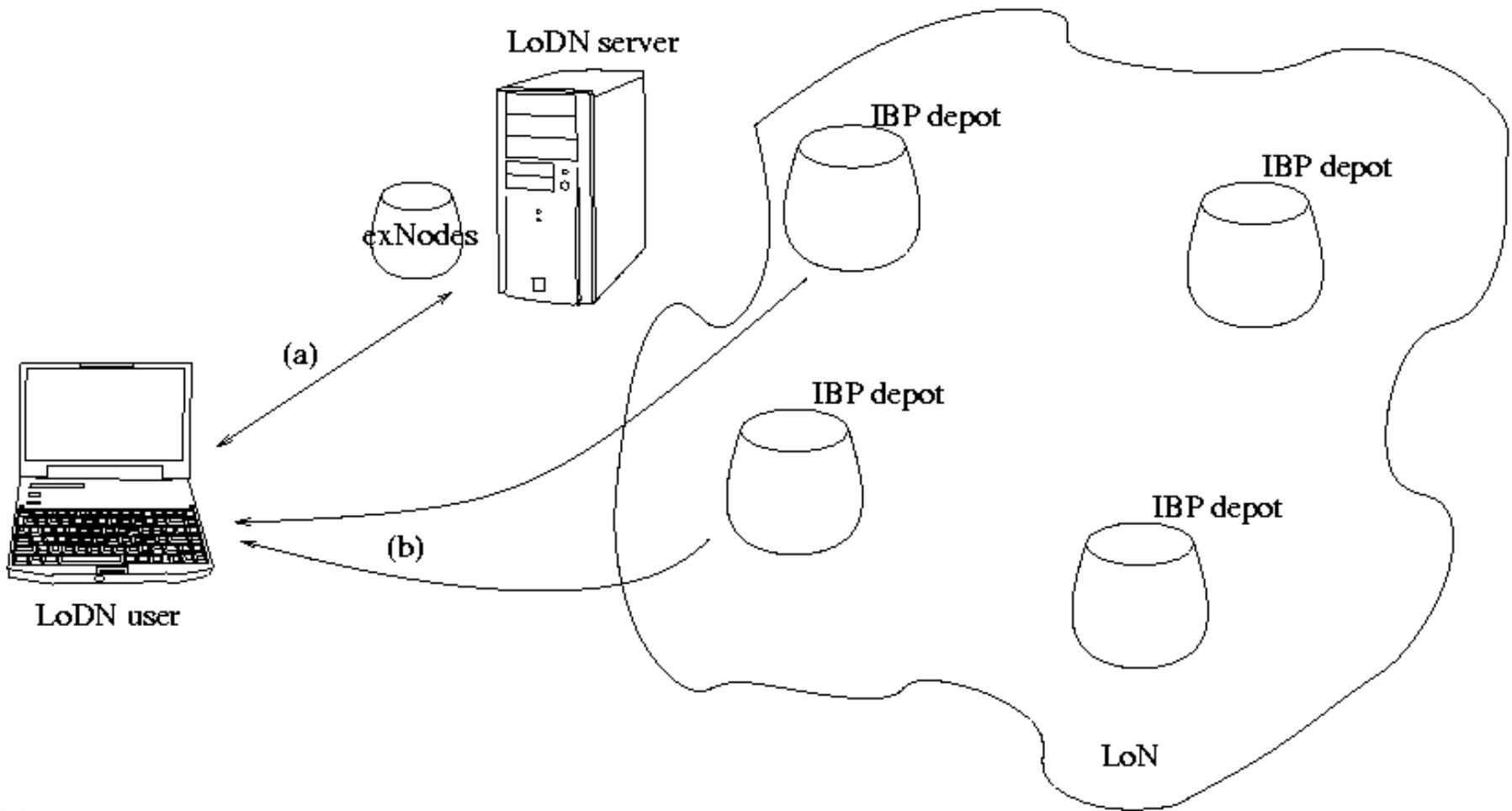
## Download

The Download dialog box features a menu bar with 'File' and 'Help'. It is divided into several sections: 'Input File' with a text field containing a URL and a 'Browse' button; 'Output File' with a text field containing a file path and a 'Browse' button; 'Connection Type' with radio buttons for 'Dial-Up/ISDN', 'DSL/Cable/T1', 'less than 100Mbps' (selected), and '100Mbps and over'; 'Advanced Parameters' with 'Number of connections' (6) and 'Transfer block size' (2) with 'KB' and 'MB' radio buttons (MB selected). At the bottom are 'Download', 'Execute', and 'Exit' buttons.

# Upload in the Logistical Network



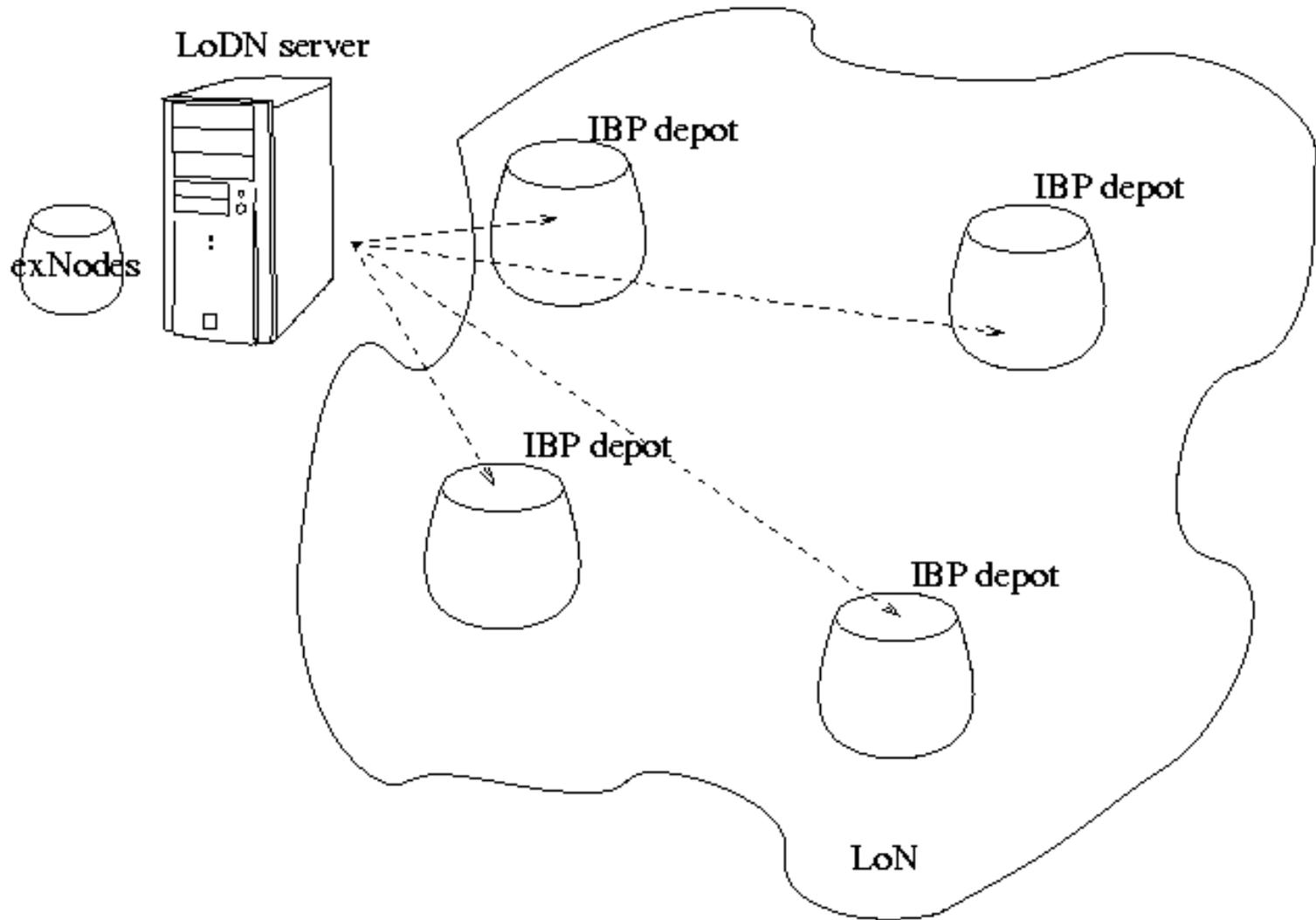
# Download from the Logistical Network



# Maintaining data integrity in a Logistical Network

- LoDN server runs a process called the **Warmer**
- Operates on all exNodes in the LoDN server to maintain data integrity
- For each exNode the Warmer can:
  - Refresh
  - Trim
  - Augment

# Data Warming in the Logistical Network



# LoDN vs. P2P

- Users do not have to share their own local disk (data are stored on publicly available storage)
- Users do not have to stay connected to keep their published data available to other users
- Users use their own computer only to upload, download and manage their data through the LoDN interface (no data, no meta-data on your local system)

# Conclusions

- LoDN is a file directory based on the IBP protocol and the exNode file description
- Members can access their LoDN directory to manage their files
- Members and non-members can access other users' published data
- LoDN provides a reliable storage service through
  - Automated duplication of data
  - Periodic renewal of time limited storage allocations
- LoDN gives fast access to the data  
(download blocks in parallel from different depots)
- Increase performance by allowing to position data close to possible download sites
- Collaborators can make LoDN data files available by including an active LoDN link on a **web page**, in a **email**, or in the LoDN content directory itself

# Limitations/Future Works

- Introduce problems of ownership and properties
- No mechanisms to limit the size of uploaded data
- Add meta-data to deal more efficiently with dynamic change

# LoDN is available Now!

`http://loci.cs.utk.edu/lodn`

`login: wace04`

`password: wace04`

*al men don't use backups, they post their stuff on a public ftp server and let the rest of the world make copies" --Linus T.  
al men don't use backups, they post their stuff on a LoDN server and let the Warmer make copies" --LoCI team :-)*