P2P and Grid Combination

(BioMAJ Peer-to-Peer extension)

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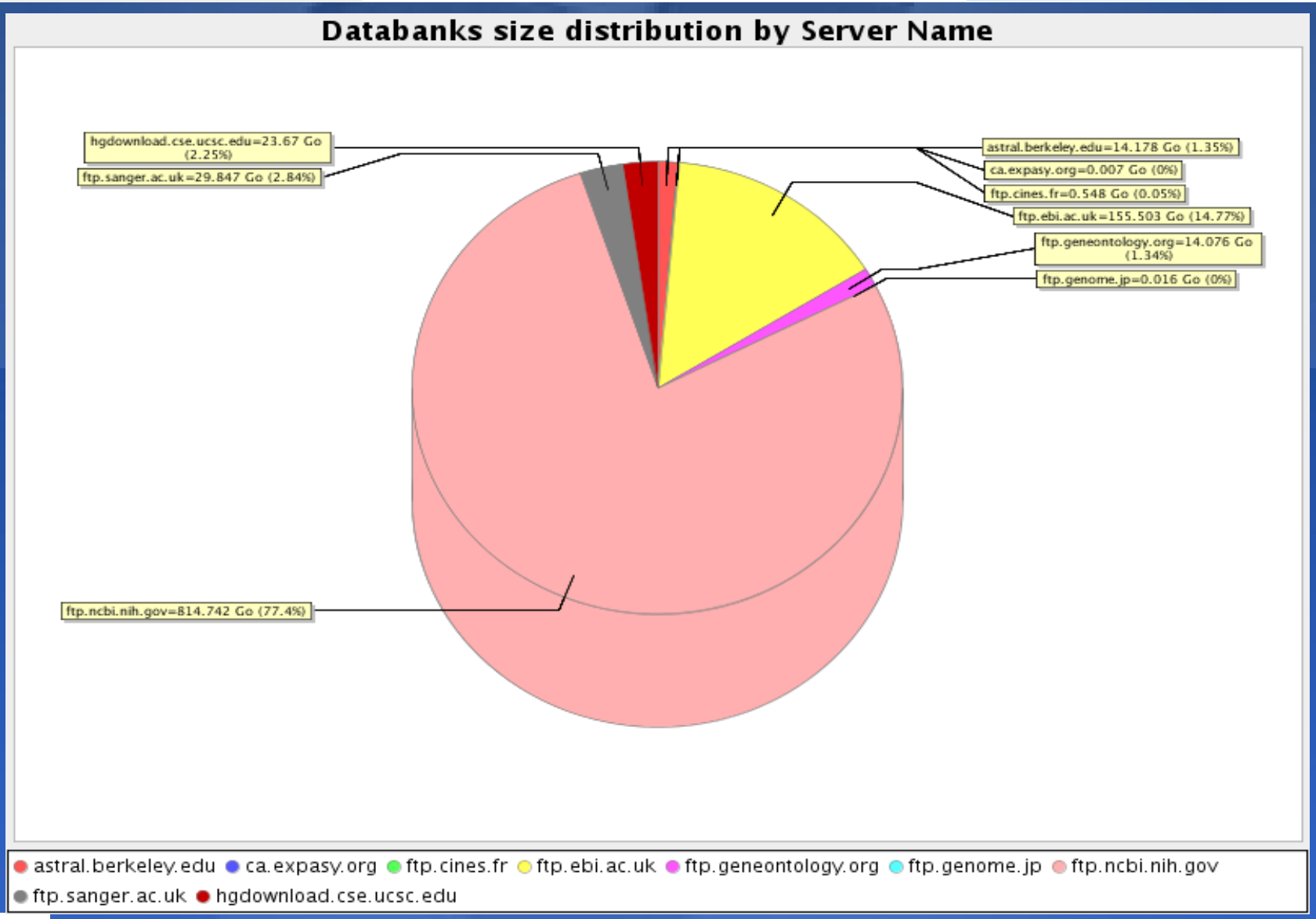
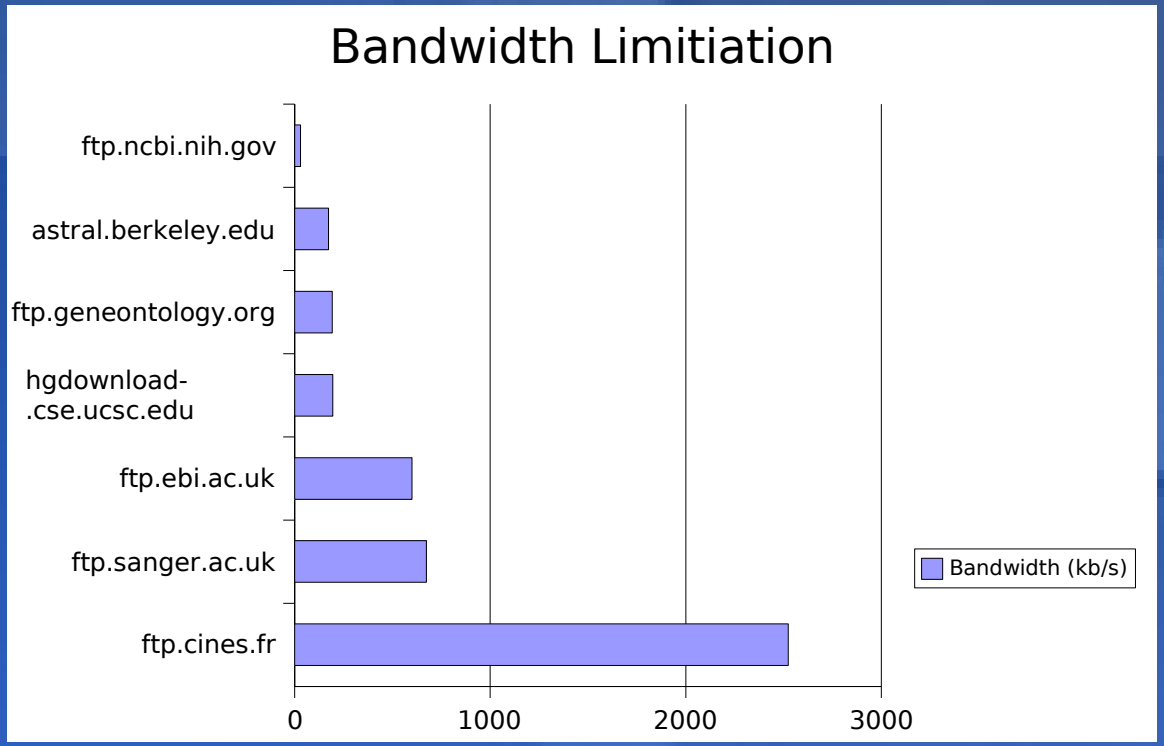
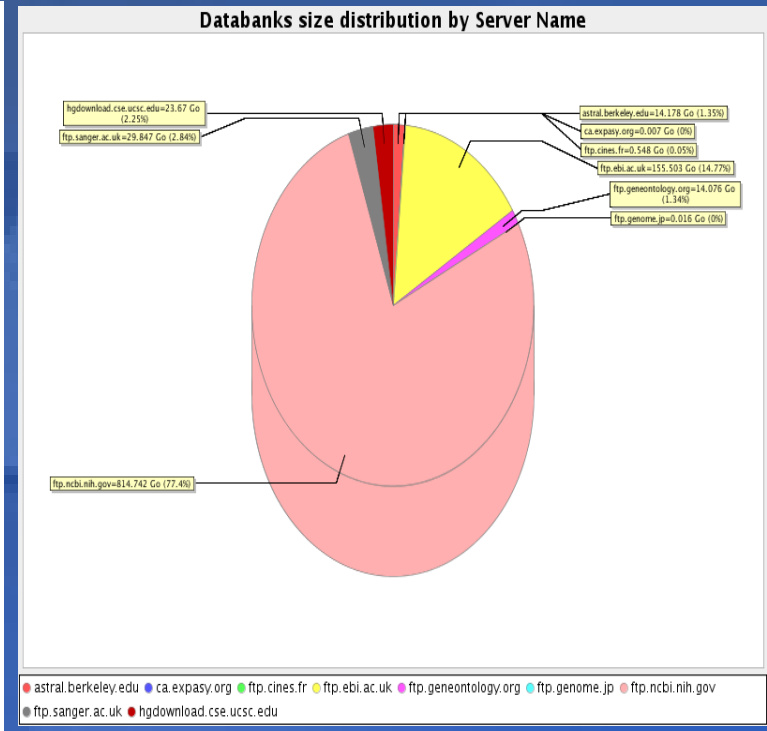
State of the Art !



Download Bandwidth Bottleneck

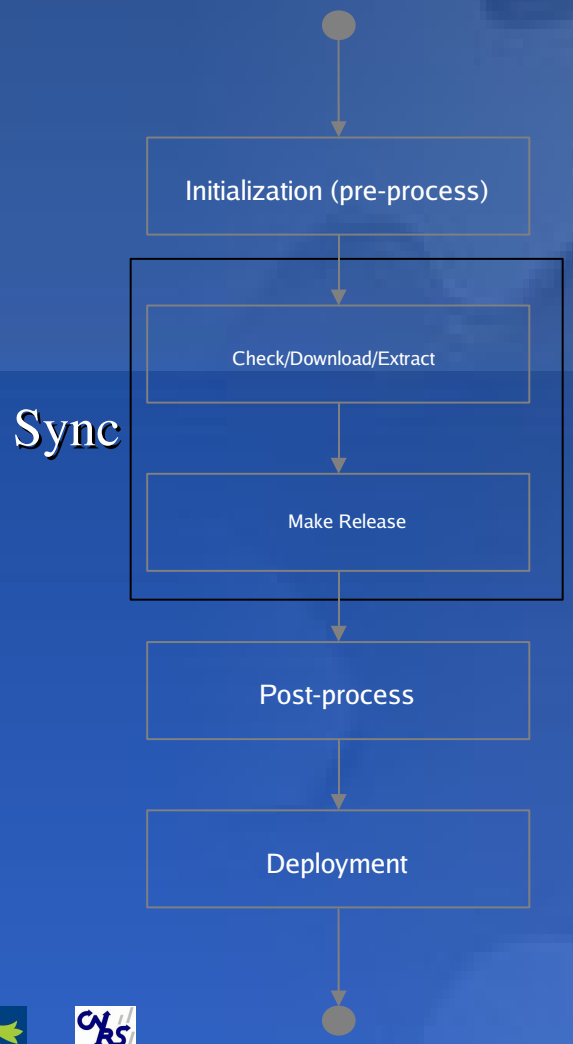
Server name	Bank Name	Bandwidth (kb/s)	Color Code
ftp.ncbi.nih.gov	Genbank, Genomes	31.12	
astral.berkeley.edu	ASTRAL	173.62	
ftp.geneontology.org	Gene Ontologie	192.76	
hgdownload.cse.ucsc.edu	GoldenPath	195.22	
ftp.ebi.ac.uk	NR, STS	600.81	
ftp.sanger.ac.uk	PFAM	674.12	
ftp.cines.fr	ImMunoGeneTics	2523.59	





BioMAJ P2P Initiative

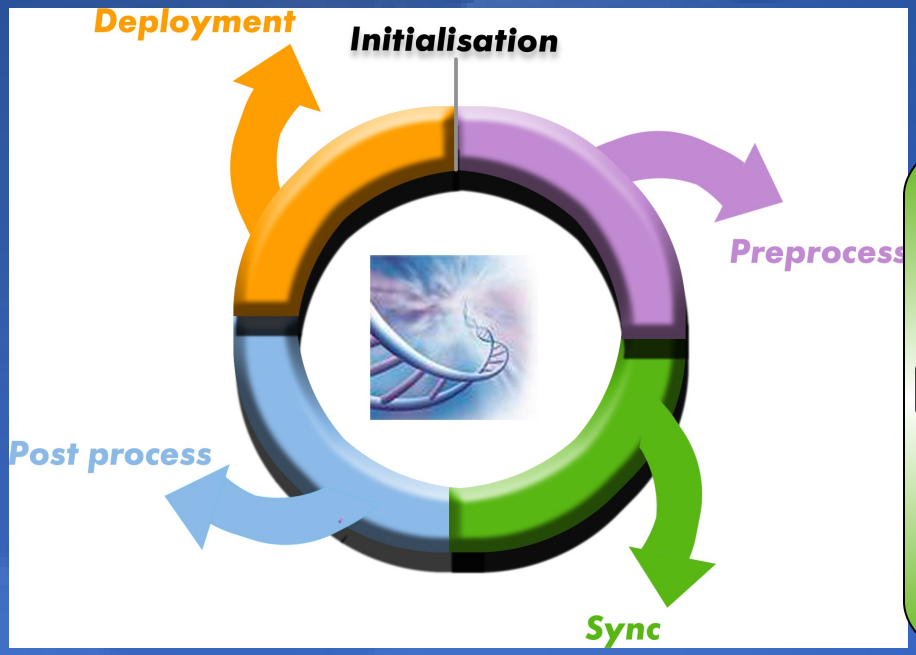
The normal WorkFlow:

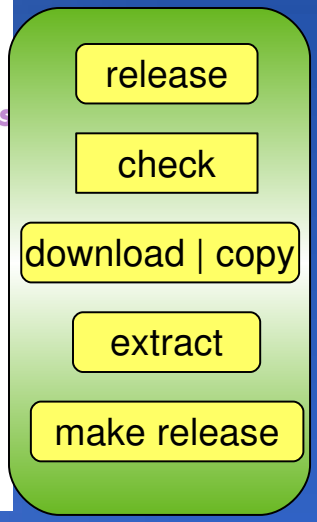


Goal:

Accelerate the download process of the banks using the Peer-to-Peer technologies to eliminate the Bandwidth Limitation problem among the Web Servers (FTP, HTTP)

Synchronisation Cycle:

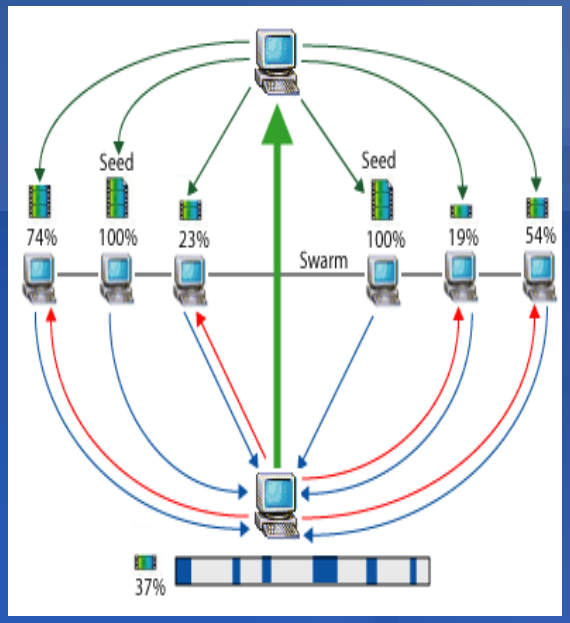




Peer-to-Peer Implementations





Advantages:

- Easy to Deploy
- Scalable
- Give-Give Protocol, thus limiting Free-Riders situations
- The network nodes are grouped around one Tracker
- Tracker uses HTTP Messages cx

Disadvantages:

- SPOF : Tracker
- Open Standard Protocol

The P2P new Workflow

BitTorrent terminology

Peer: A peer (synonymous with "client") is one instance of a BitTorrent client that does not have the complete file, but only parts of it.

Seeder: A seeder is a peer that has a complete copy of the torrent and still offers it for upload.

Torrent File: The torrent file contains metadata about all the files it makes downloadable, including their names and sizes and checksums of all pieces in the torrent.

Swarm: All peers (including seeders) sharing a torrent are called a swarm.

Tracker: A tracker is a server that keeps track of which seeds and peers are in the swarm. Clients report information to the tracker periodically and in exchange receive information about other clients to which they can connect.

The Prototype Components

The Client

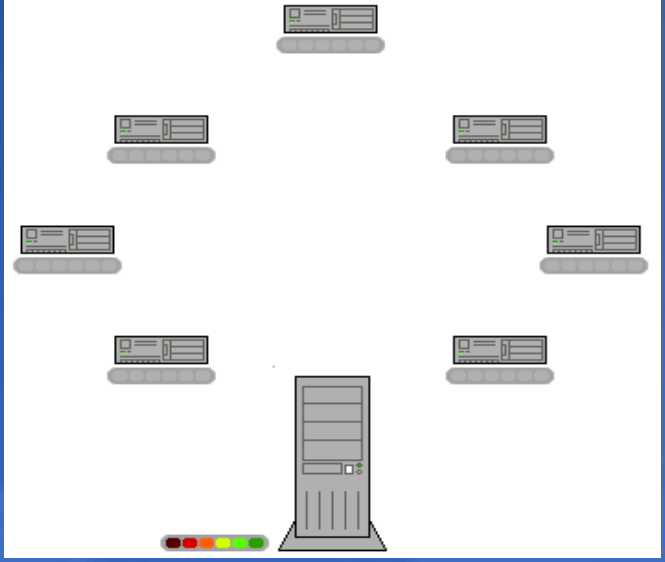
The Seeder *

The Tracker *

* Run as Stand-Alone Application (resident memory app)

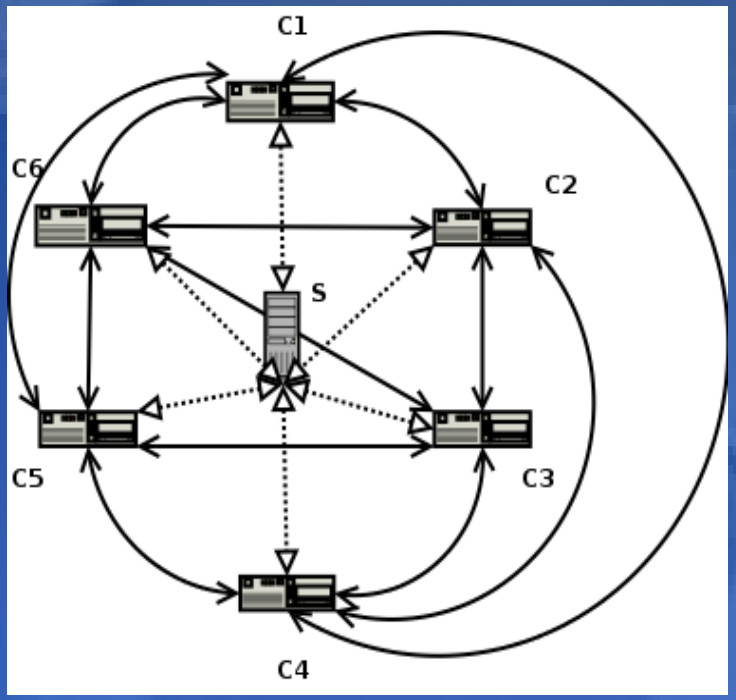
The Client Application functionalities

- Databank Downloading using BitTorrent Protocol
- Torrent File generation for a local Bank repository
- Torrent File Publishing on the Tracker



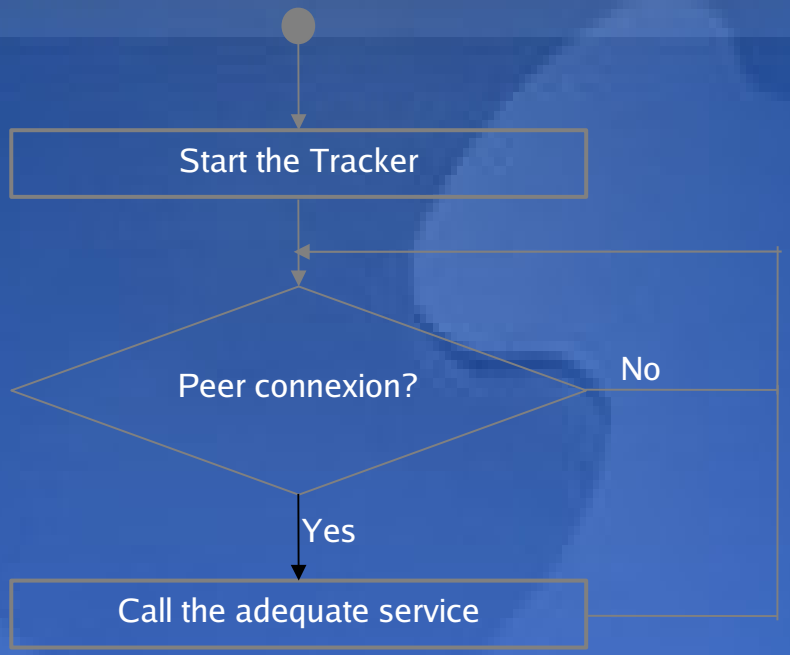
The Seed Application functionality

- DataBank Sharing



The Tracker App functionalities

- TrackerService for the sharing management
- TorrentServices for Torrent File Management

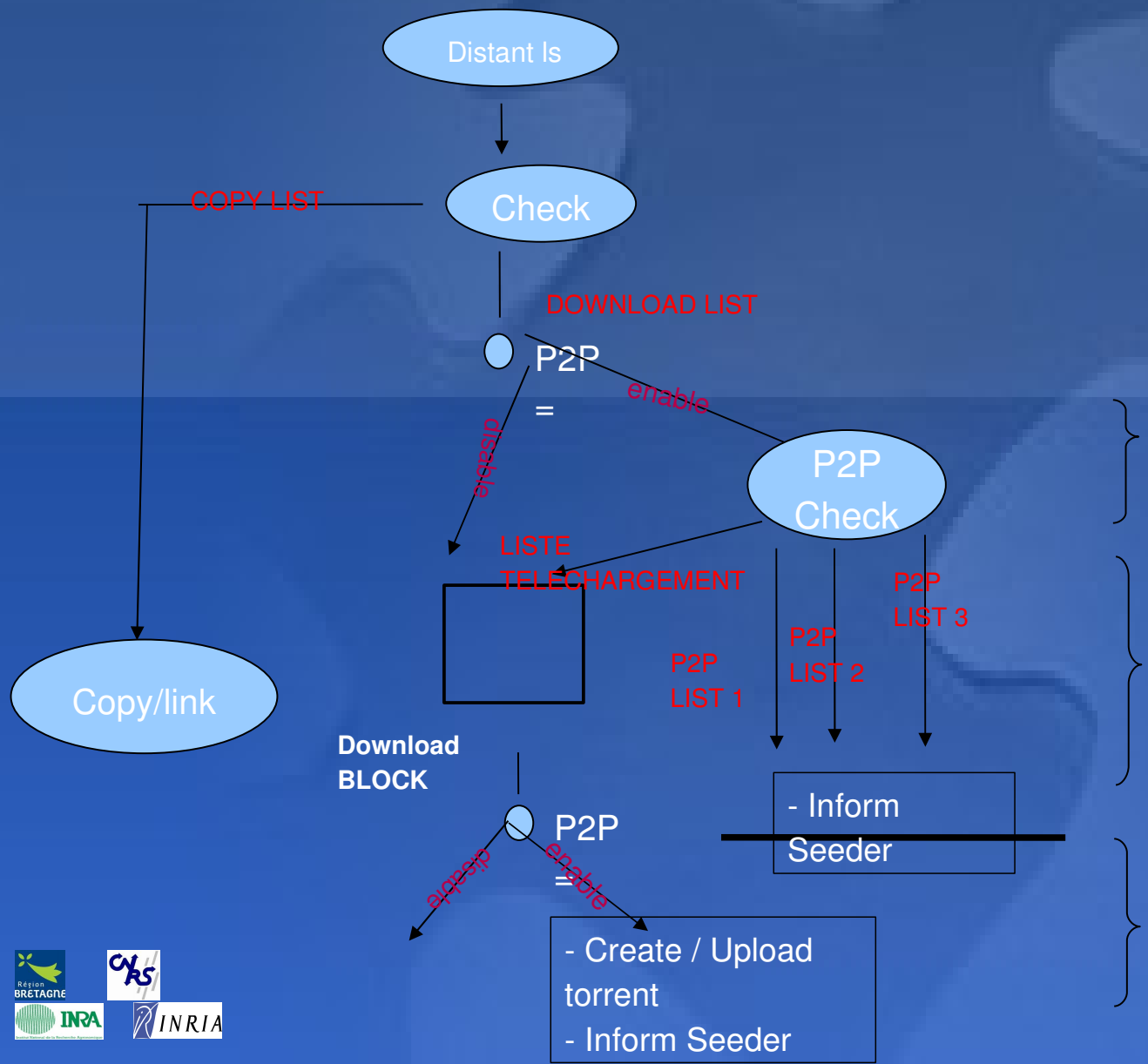


.Torrent File Content (MetaData)

d8:announce31:http://biomaj.genouest.org:80827:comment30:PropertiesfilegenbankRelease10:createdby9:HiKarkour4:infod6:lengthi3583e4:name25:genbankRelease.properties12:piecelengthi65536e6:pieces20:\D}ó~S~Eð÷~Am~@^F^Y^H~[~H×@-Ñee

- Tracker URL
- File(s): Name, Length, Piece Length used, SHA-1 hash code for each piece
- Comments :
  - Server Name
  - Remote Dir
  - Remote Files & Remote Files Excluded
  - Attribute File List (size,date)
  - BioMAJ MetaData

The new Sync Cycle



From the Download List:
- New Download List
- P2P / Torrent Lists

- N Workflows torrent (existing torrent)

- 1 actual Workflow (Creating a new torrent)

Inserting Torrent comments :
- Download LIST with file attributes (date,size)
- SERVER (property)
- REMOTE.DIR (property)

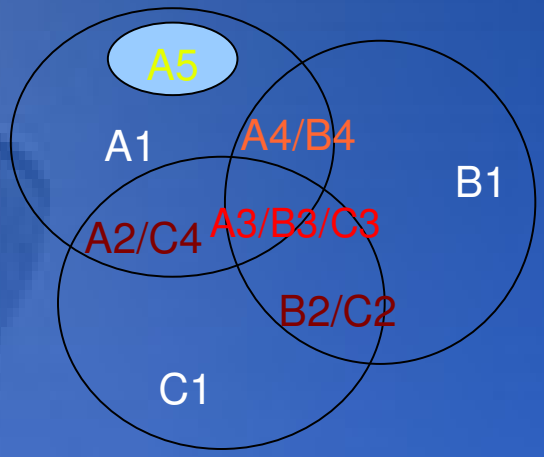
USE CASES

Case	Bank	Local Repository	Tracker	Choice
1	A*B*C	A{1,4,5}	B, C	C
2		A{1,3,4,5}	B, C	C
3		A{1,3,5}	B, C	B & C
4		A{1,2,4,5}	B, C	B | C
5		A{1,4,5}	B	B & FTP(A2)
6		A{1,3}	B, C	B & C & FTP(A2)

Let 3 groups of files : A, B et C that have the following caracteristics:

- Same ServerName&RemoteDir
- A, B and C have certain files in common

B and C are available via 2 torrents

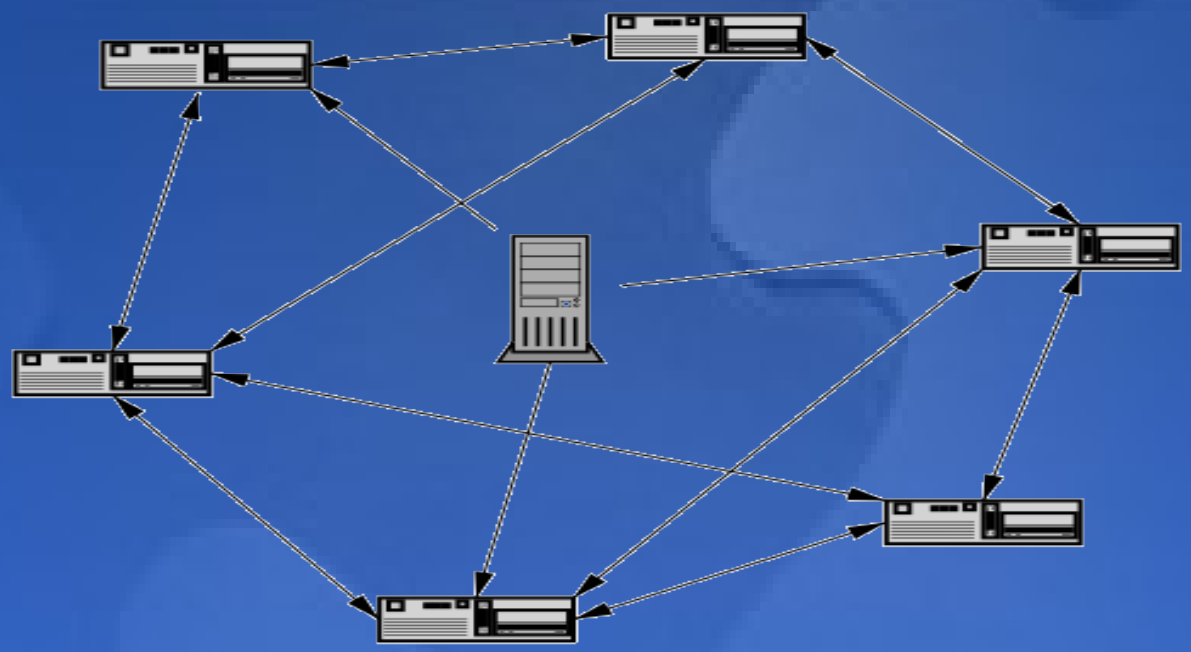


Security Features

- ACLS Access list at the Tracker Application Level

Notes :

- The Protocol tracker/client is based on HTTP messages
- The Protocol client/client is based on TCP



Roadmap

- Past :
  - Study of the available Peer-to-Peer protocols
  - Development of a Prototype
- Current :
  - Performance test on genbank (326GB) using the current Prototype
- Dev to come :
  - Tracker Modification (file search, file replacement)
  - Implementing the new Prototype to the BioMAJ WorkFlow
- Beta Version Release :
  - ~ March 2008
- Future work (Proposition) :
  - A “Cloud Computing” version running in a parallel grid environment with optional features (distributed data indexing, etc...)

Acknowledgements

- Sarah Dagher : Internship from ESIB-USJ
- DataMan & DocMen !

Q&A

http://biomaj.genouest.org

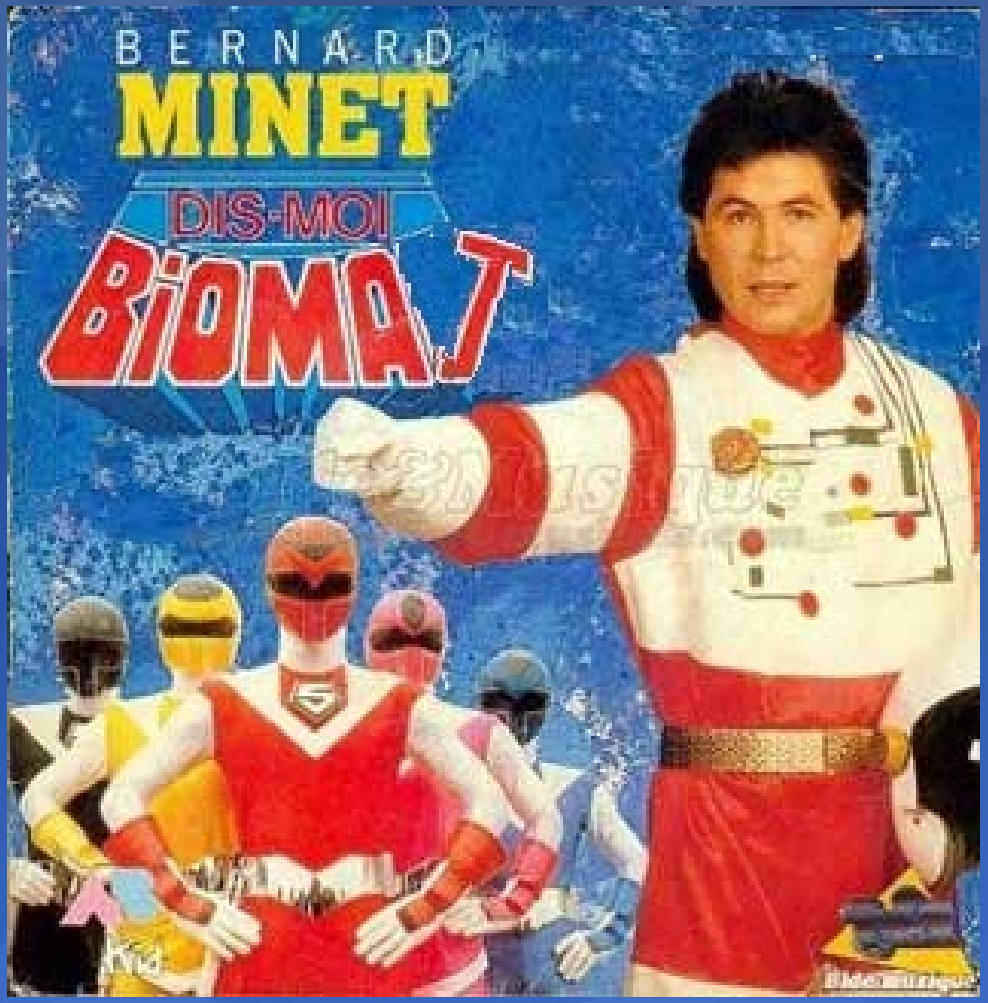
If what has been occurring in IT during the past decade can be classified as the **'information age'**, then going forward it's going to be viewed more as the **'connection age'**

Ray Ozzie, CEO and chairman of Groove Networks (Year 2002)

Thank You All

P2P Works fine with Private DivX, Why shouldn't work with Public DataBanks!!!

BioMAJ ....



... The Return !