

# The (B)right future of software installation

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# WHAT IS THE BEST METHOD TO INSTALL SOFTWARE?

- What to install
- Where/when to do it
- How should it be done



# What to install

- Two types of packages:
  - Experiment software:  
 ,  ,  AliRoot
  - GRID interface: 
- Requirements
  - Self-contained
  - Platform dependent
  - User space
  - Size does matter



# Build & Test systems



## AliEn BITS Global View

i686 | x86\_64 | Itanium | IntelMac | IntelMac64 | VM\_i686 | SLC5\_i686 | SLC5\_x86\_64 | UBUNTU\_x86\_64 | Show AliEn Test results

Jump to i686

### AliEn Releases for i686-pc-linux-gnu

Release	Date	Description	Status	Built on	Build time	Build #
HEAD	--f--f--f--	Current CVS head	✓	Wed Mar 11 16:10:29 2009	00:08:28	30
v2-16	18/11/2008	Stable	✓	Wed Mar 11 14:39:40 2009	00:08:27	48
v2-15	14/05/2008	Stable	✓	Fri Nov 14 18:06:16 2008	00:05:20	64
v2-14	06/12/2007	Stable	✓	Tue Apr 22 13:54:10 2008	00:02:51	2
v2-13	23/04/2007	Stable	N/A	N/A	N/A	N/A
v2-12	29/11/2006	Stable	N/A	N/A	N/A	N/A
v2-11	07/09/2006	Stable	N/A	N/A	N/A	N/A
v2-10	15/05/2006	Stable	N/A	N/A	N/A	N/A

Generated on: Wed Mar 11 16:11:26 2009

### Installation Tests for i686-pc-linux-gnu

Release	Build #	Built on	Test Status	Tested
HEAD	30	Wed Mar 11 16:10:29 2009	✓	Thu Mar 12 07:11:22 2009
v2-16	48	Wed Mar 11 14:39:40 2009	✓	Wed Mar 11 14:39:40 2009
v2-15	64	Fri Nov 14 18:06:16 2008	✓	Fri Nov 14 18:06:16 2008
v2-14	2	Tue Apr 22 13:54:10 2008	✗	Tue Apr 22 13:54:10 2008

Generated on: Wed Mar 11 16:11:26 2009

Jump to x86\_64

### AliEn Releases for x86\_64-unknown-linux-gnu

Release	Date	Description	Status	Built on
HEAD	--f--f--f--	Current CVS head	✓	Wed Mar 11 17:09:17 2009
v2-16	18/11/2008	Stable	✓	Wed Mar 11 14:50:51 2009
v2-15	14/05/2008	Stable	✓	Fri Nov 14 22:04:45 2008
v2-14	06/12/2007	Stable	✗	Tue Sep 9 18:29:52 2008
v2-13	23/04/2007	Stable	N/A	N/A

## AliEn Build Integration and Testing System

Platform: i686-pc-linux-gnu  
Release: v2-16  
Goto: All Releases | HEAD | v2-16 | v2-15 | v2-14 | Test Logs

### AliEn Installation Tests for v2-16

Build number	Built on	Tested
48	Wed Mar 11 14:39:40 2009	Wed Mar 11 14:39:40 2009

#### Test progress

Overall Status	Stopped AliEn (before)	Cleanup	Installer	Rev
✗	✓	✓	✓	1.1

#### Test details

Create cert New VO User tests APF

AliEn Services	Failed Tests
ApiService.log	10.test.603-aliensh-basics
Authn.log	10.test.97-pam
Authn.log back	11.test.06-createKeys
Broker.Job.log	11.test.610-vroot9-se
Broker.Job.log back	11.test.20-shles
Broker.Transfer.log	124.test.302-banUserCommand
Broker.Transfer.log back	125.test.303-banAdminCommand
CE.log	126.test.304-evacOrder
CE.log back	126.test.304-evacOrder

#### Main Log:

```
Starting FITS [2009_03_11-15:02]...
Shell limits:
core file size      (kbytes, -c) 0
data seg size      (kbytes, -d) unlimited
file size          (blocks, -f) unlimited
pending signals    (-l) 1024
max locked memory  (kbytes, -l) 32
max memory size    (kbytes, -m) unlimited
open files         (-n) 1024
pipe size          (512 bytes, -p) 8
```



## AliRoot BITS Global View

i686 | x86\_64 | Itanium | IntelMac | IntelMac64 | About AliRoot

Jump to i686

### AliRoot Releases for i686-pc-linux-gnu

Release	Date	Description	Status	Built on	Build time	Build #
HEAD	--f--f--f--	Current CVS head	N/A	N/A	N/A	N/A
v4-16-Rev-06	02/03/2009	02/03/2009	✓	Thu Mar 12 07:11:22 2009	05:34:59	4
v4-16-Rev-05	28/01/2009	28/01/2009	✓	Sat Jan 31 07:05:19 2009	05:26:35	3
v4-16-Rev-04	22/01/2009	22/01/2009	✓	Sat Jan 24 06:58:53 2009	05:28:55	2
v4-16-Rev-03	19/12/2008	19/12/2008	✓	Tue Jan 6 06:32:05 2009	05:26:30	6
v4-16-Rev-02	12/12/2008	12/12/2008	✓	Fri Dec 12 16:40:50 2008	05:30:05	2
v4-16-Rev-01	13/11/2008	13/11/2008	✗	Thu Nov 13 14:47:17 2008		1

Jump to x86\_64

### AliRoot Releases for x86\_64-unknown-linux-gnu

Release	Date	Description	Status	Built on	Build time	Build #
HEAD	--f--f--f--	Current CVS head	N/A	N/A	N/A	N/A



# More than 200 individual packages



## AliEn Build Integration and Testing System

Platform: i686-pc-linux-gnu  
Release: HEAD

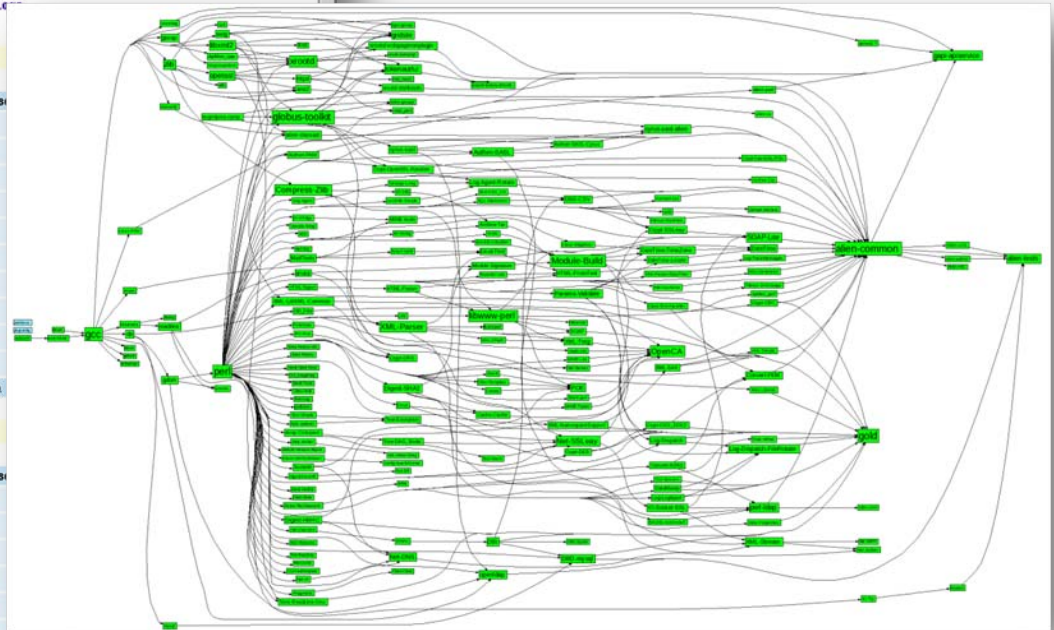
Go to: All Releases | All Build .alien .base .devel .gcc .monitor .portal .server | All SLOC | All Dependencies | Alien Tests L...

### alien

Package	Version	Status	Prepare	Make	-install	-test	-cache	-autopkg	Files	Licens
alien-admin	HEAD_19	✓	OK	OK	OK	N/A	OK	OK	325KB	-
AliEn-ARC	HEAD_18	✓	OK	OK	OK	OK	OK	OK	14KB	-
alien-classad	2.1.1_3	✓	OK	OK	OK	OK	OK	OK	104KB	-
alien-common	HEAD_18	✓	OK	OK	OK	N/A	OK	OK	2MB	-
gapi-spiservice	2.1.16_18	✓	OK	OK	OK	N/A	OK	OK	6MB	-
alien-gssapi	2.1.6_4	✓	OK	OK	OK	N/A	OK	OK	40KB	-
AliEn-LCG	HEAD_19	✓	OK	OK	OK	OK	OK	OK	82KB	-
alien-perl	2.1.2_3	✓	OK	OK	OK	N/A	OK	OK	3KB	-
cyrus-sasl-alien	2.1.22_5	✓	OK	OK	OK	N/A	OK	OK	143KB	-
alien-tests	HEAD_20	✓	OK	OK	OK	N/A	OK	OK	444KB	-
<b>Total</b>	<b>10 pkgs</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>3, 7 n/a</b>	<b>10</b>	<b>10</b>	<b>10MB</b>	<b>10 n/a</b>

### base

Package	Version	Status	Prepare	Make	-install	-test	-cache	-autopkg	Files	Licens
Algorithm-Diff	1.1901_3	✓	OK	OK	OK	OK	OK	OK	137KB	Perl
ApMon_perl	2.2.19_3	✓	OK	OK	OK	OK	OK	OK	124KB	-
ApMon_cpp	2.2.6_2	✓	OK	OK	OK	N/A	OK	OK	313KB	-
Archive-Tar	1.29_3	✓	OK	OK	OK	OK	OK	OK	142KB	Perl
Archive-Zip	1.16_3	✓	OK	OK	OK	OK	OK	OK	256KB	Perl
Array-Compare	1.16_3	✓	OK	OK	OK	OK	OK	OK	30KB	Perl
Authen-FAM	0.15_3	✓	OK	OK	OK	N/A	OK	OK	61KB	Perl
Authen-SASL	2.10_4	✓	OK	OK	OK	OK	OK	OK	87KB	Perl
Authen-SASL-Cyrus	0.13-server_4	✓	OK	OK	OK	N/A	OK	OK	53KB	Perl
BSD-Resource	1.2901_3	✓	OK	OK	OK	OK	OK	OK	72KB	Perl
Cache-Cache	1.04_3	✓	OK	OK	OK	OK	OK	OK	243KB	Perl
Class-Base	0.03_3	✓	OK	OK	OK	OK	OK	OK	49KB	Perl



Easy to add new packages, move to new platform, get files from different sources, apply patches, define dependencies ...



- Combine all the required grid packages into distributions
  - Full installation: 155 MB, mysql, ldap, perl, java...
  - VO-box: 122 MB, monitor, perl, interfaces,
  - User: 55 MB, API client, gsoap, xrootd
  - Worker node: 34 MB, min perl, openssl, xrootd
- Experiment software:
  - AliRoot: 160 MB
  - ROOT: 60 MB
  - GEANT3: 25MB

300 MB  
to run  
jobs



- Current scenario
  - One installation (per platform) per site
  - On a shared area
    - High bandwidth
    - Security risk
  - AliEn installation:
    - New sites: running a script
    - Updating a site: triggered by a VO admin
  - Experiment software:
    - Install on demand according to the jobs
    - Before submitting JobAgents

Do we need it?



# Can we do something better?

- Automatic installation on every worker node
- Automatic
- Self-contained
- User space
- Small software (300 MB)
- Job Agents (can run more than one small job)



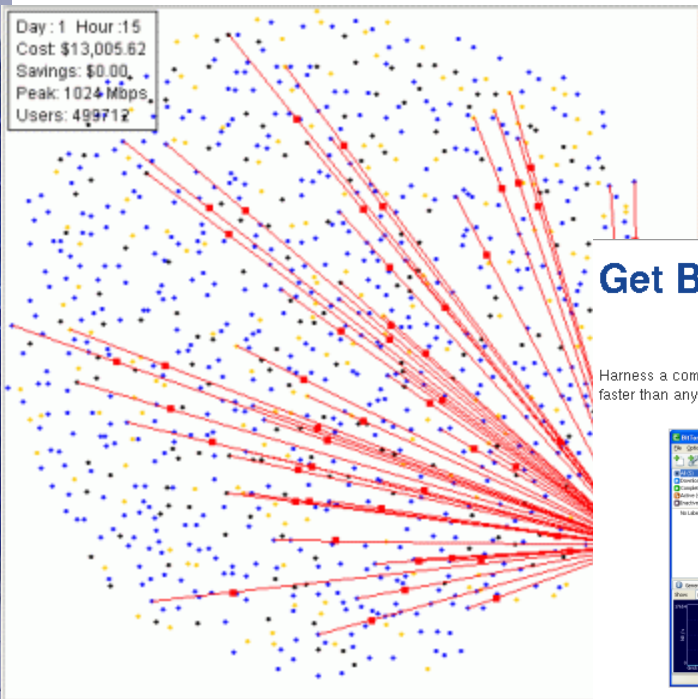


- Landing on a virgin worker node
- Sending a small script that:
  - Finds a scratch area in a local disk
  - Installs latest version of AliEn
    - Simple requirements: wget
  - Starts a Job Agent
    - JobAgent will install required experiment software
  - After finishing, removes everything
    - Or leaves it for the next agent... (still to be evaluated)

## But how to get the files...



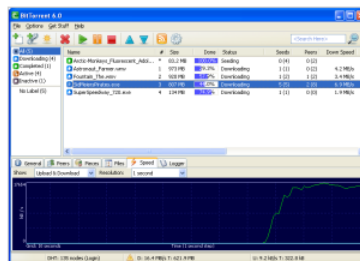
# Let's go mainstream!!



More than 150 million users!!

## Get BitTorrent

Harness a community of over 150 million users to deliver files to your PC faster than anything else.



The new BitTorrent 6 for Windows brings together BitTorrent's proven expertise in networking protocols with µTorrent's efficient implementation and compelling UI to create a better BitTorrent client. For questions about the BitTorrent client, take a look at the FAQ in our [support center](#), or visit the [client forums](#).

Advertisement

[Get BitTorrent](#)

Download other versions:

- [BitTorrent for Windows](#)
- [BitTorrent for MacOS X](#)
- [Linux, Source Code, and Older Versions](#)

If you encounter any problems, please report them in the [Client Forums](#).

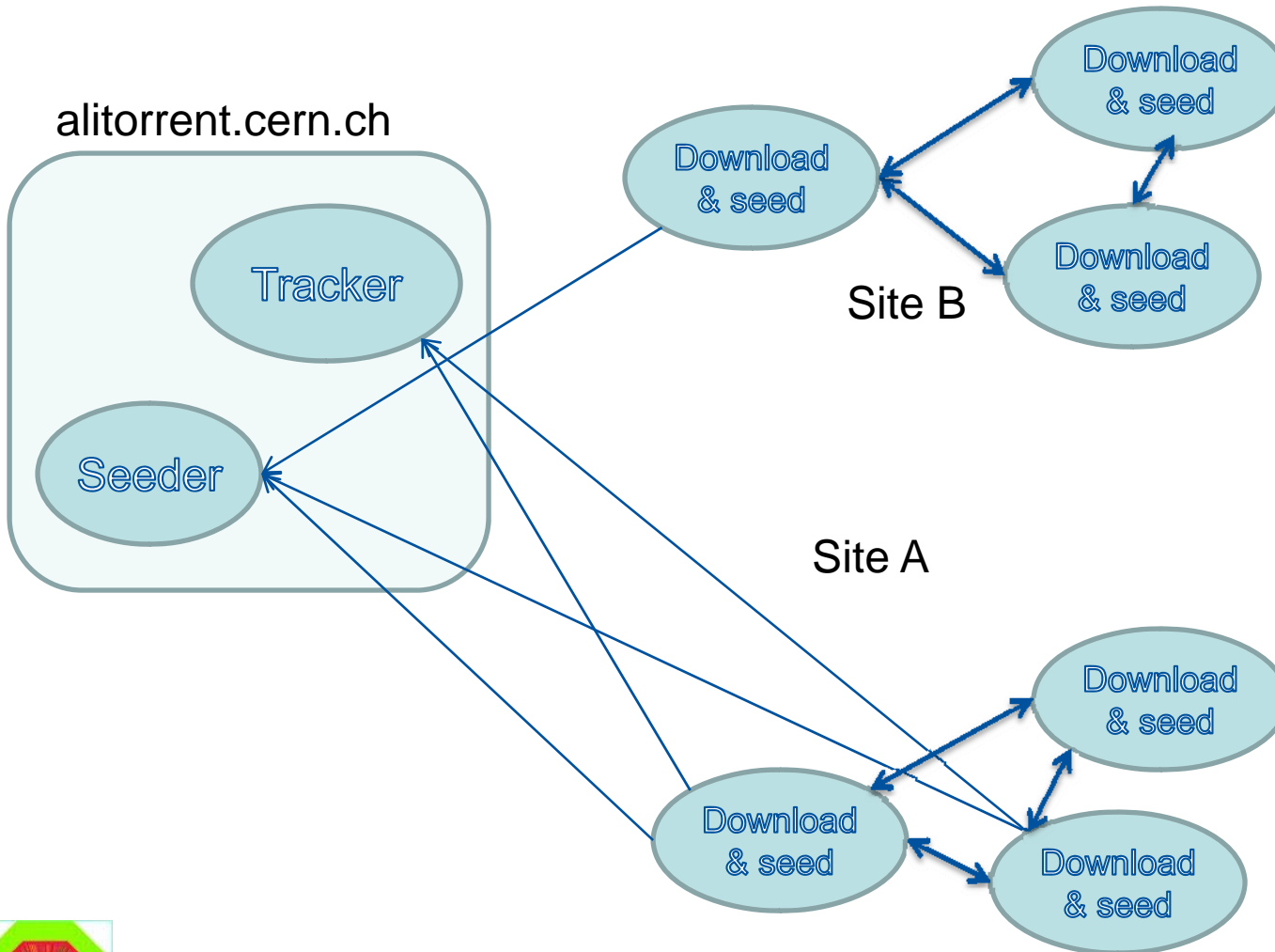
## BitTorrent 6 Features

- Lightweight client
- Local peer discovery
- Configurable bandwidth scheduler
- Global and per-torrent speed limiting
- RSS Downloader
- [Always Spyware-Free](#)

# http://bittorrent.com



# Torrent technology

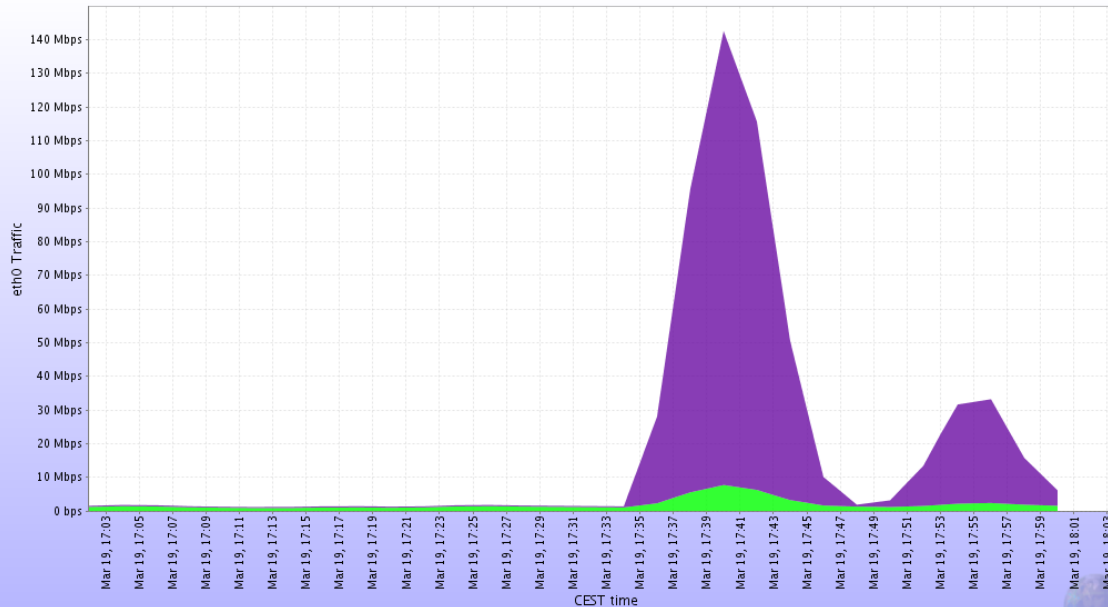


- Torrent files created from the build system
- One seeder at CERN
  - Standard tracker and seeder.
- Get torrent client from ALICE web server
  - Aria2c
- Download the files and install them
- Seed the files while the job runs



# Load on the server

eth0 Traffic on aliendb9.cern.ch

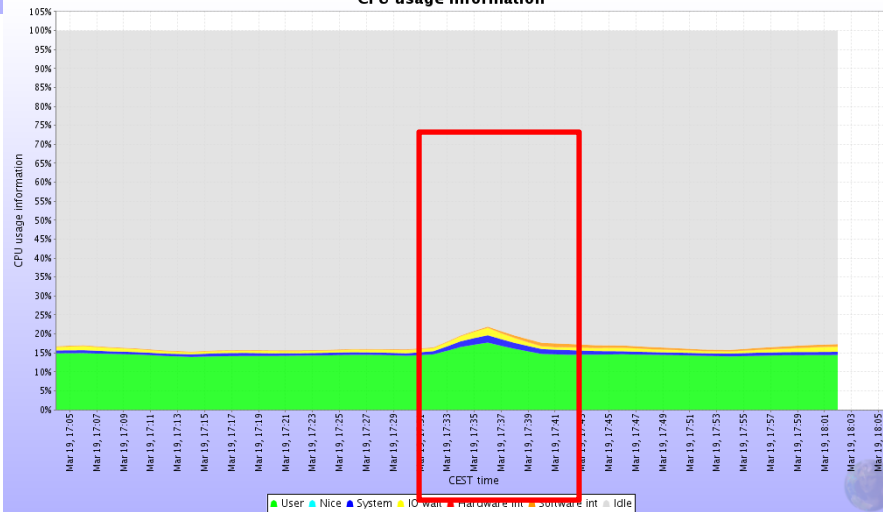


600 clients at CERN:  
 $600 \times 300\text{MB} = 180\text{GB}$

Downloaded from the  
server: 7GB

Fetches from other wn:  
173GB

CPU usage information



Negligible CPU load  
Network load limited by  
conf  
Network load does not  
increase with more  
clients



- Working in collaboration with CERN Security team
- Peer-peer is allowed for professional usage
- Torrent files have checksums to detect corrupted files/wrong files
- Only VO admin can register files in tracker
- Signing the packages



- What if a wn modifies a file?
  - Torrent technology detects and prevents it



- Each chunk is individually signed
  - The whole file can be also signed with a certificate
- Can any user transfer files?
  - NO. Only VO admin can register files in the tracker
- Do site admins have to open ports on wn?
  - Only within the site



- Involve more sites
  - Do we need more seeders?
    - One main seeder should be enough
    - Otherwise, add seeder to (some) voboxes, or to other machines
- Larger scale
  - We have verified up to  $O(1000)$  jobs
- Reuse downloaded files on the same wn





- Build and test system for multiple platforms
  - Small, self-contained packages
- GRID software updates triggered by VO admin
- Automatic installation on every worker node
- Using torrent technology to transfer files
  - Already tested by millions of users
  - Reduce inter-site transfers
  - No extra requirements on worker nodes
- No need for a shared area
- Same algorithm could be used by other VOs



# Great! How to use it

- To install alien:
  - wget <http://alien.cern.ch/alien-torrent-installer>
- Any file in the catalogue registered with torrent://...
  - This can be used for packages
  - Or for any other data...



# Example

```
psaiz@pcegee02:~ - Shell No. 5 - Konsole
Session Edit View Bookmarks Settings Help

[aliendb06c.cern.ch:3307] /alice/cern.ch/user/p/psaiz/packages/ROOT/v5-22-00p/ > whereis Linux-x86_64
May 26 18:46:38 info The file packages/ROOT/v5-22-00p/source is in
SE => no_se pfn => torrent://alitorrent.cern.ch/torrents/root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6.tar.gz.t
orrent

[aliendb06c.cern.ch:3307] /alice/cern.ch/user/p/psaiz/packages/ROOT/v5-22-00p/ > get Linux-x86_64
May 26 18:47:30 info The file packages/ROOT/v5-22-00p/Linux-x86_64 is in
SE => no_se pfn => torrent://alitorrent.cern.ch/torrents/root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6.tar.gz.t
orrent

May 26 18:47:30 info Getting a security envelope..
May 26 18:47:30 info In getfile, with no_se
May 26 18:47:30 info Getting the file torrent://alitorrent.cern.ch/torrents/root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6.tar
.gz.torrent
May 26 18:47:37 info Getting a torrent file
May 26 18:47:37 info Getting the file http://alitorrent.cern.ch/torrents/root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6
.torrent, using the IP 137.138.41.23
2009-05-26 18:48:15.136477 NOTICE - Your share ratio was 0.0, uploaded/downloaded=0B/10B

Download Results:
gid|stat|avg speed |path/URI
=====
1| OK| 1.7MiB/s|[MEMORY]root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6.tar.gz.torrent
2| OK| 3.7MiB/s|/tmp/psaiz/cache/root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6.tar.gz.torrent
2-00.Linux-x86_64-2.6-gnu-3.4.6

Status Legend:
(OK):download completed.
and 1
May 26 18:48:15 info Here we should check the signature
May 26 18:48:15 info And move the file
May 26 18:48:15 info Finally, start the seeder
May 26 18:48:15 info Returning
May 26 18:48:16 info Everything worked and got /tmp/psaiz/cache/root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6.tar.gz.torrent.
45161243356457
And the file is /tmp/psaiz/cache/root_v5-22-00.Linux-x86_64-2.6-gnu-3.4.6.tar.gz.torrent 45161243356457
[aliendb06c.cern.ch:3307] /alice/cern.ch/user/p/psaiz/packages/ROOT/v5-22-00p/ >
```

Please, try it  
now!!  
File  
downloaded  
using torrent



# Please, try it out...

- Login to your vbox
  - ssh ...
- Make sure that you have a valid proxy
  - alien proxy-info
- Connect to alien:
  - alien
- Go to my directory:
  - cd /alien/cern.ch/user/p/psaiz/packages/ROOT
- Check where the file is:
  - whereis v5-22-00p/Linux-x86\_64
- Get the file:
  - Get v5-22-00p/Linux-x86\_64





## Alice T1/T2 Tutorial BitTorrent Usage Questions & Concerns from the IN2P3 federation

- Disclaimer : this is a summary from exchanges in the LCG-FR discussion list for technical issues. I did my best to accurately report the questions. Answers are what I understood from Pablo and Costin's replies. JM.



- Cache on every worker node?
  - For the time being, no cache. Everything deleted after the job finishes.
- If a worker node runs 8 jobs simultaneously...
  - ... there will be 8 different installations
- It seems stupid to install the software 8 times if the machine runs 8 Alice jobs.
  - If this is a bottleneck, we will reuse the files. At the moment, we want to stress the download
- Will the cleaning be done if a job crashes ?
  - Yes, it will. Cleaning done automatically by CREAM, LCG-CE ...
- Compiling on every worker node?
  - No! Distributing binary code



- Could one user overwrite software of another user?
  - No! Each job runs inside an LCG sandbox
- If a file is corrupted, it will be very difficult to find where it came from
  - Torrent does corruption detection
- How will local clients prefer using local seeder instead of all going to the CERN seeder ?
  - Torrent protocol. It favours closer seeders with high connectivity
- If the central machine is hacked, all wn are exposed
  - Yes, but:
    - Machine well under control
    - Are there other options? SE hacked? Build systems hacked? CVS server hacked?



- Single Point of Failure: CERN tracker
  - No. We could register alternative PFN
- The network traffic between worker nodes will increase and in an uncontrolled manner.
  - The network traffic from your nfs will decrease
- Do we have to open ports on worker nodes?
  - No!
- It would be nice to have a multi-vo solution...
  - This setup can be used by other VOs: convince them!!

