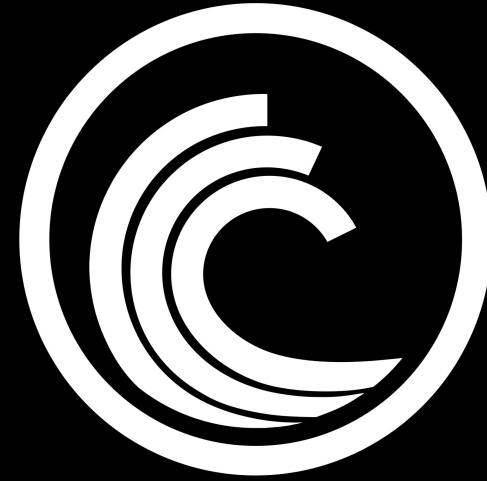


git



# GitTorrent

*The decentralized information manager from hell*

Manas Pratim Biswas

Roll - 002011001025      UG - IV

Information Technology

Jadavpur University



# Introduction

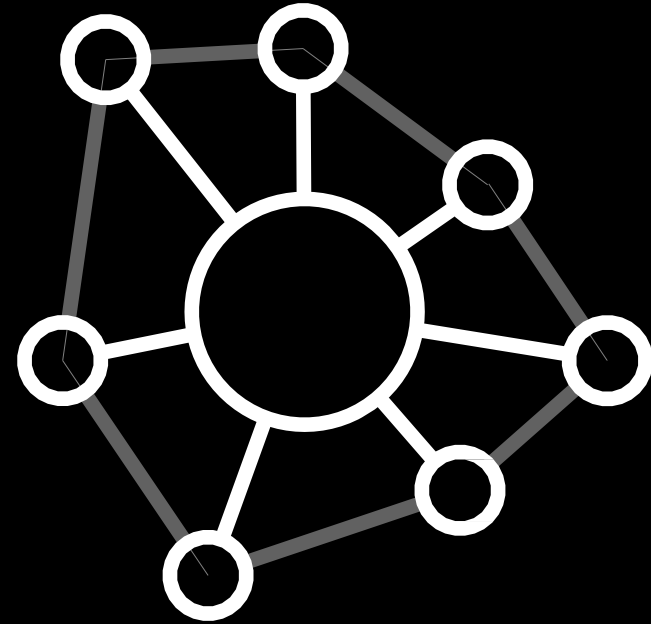




# Looking Back



# Federated Internet

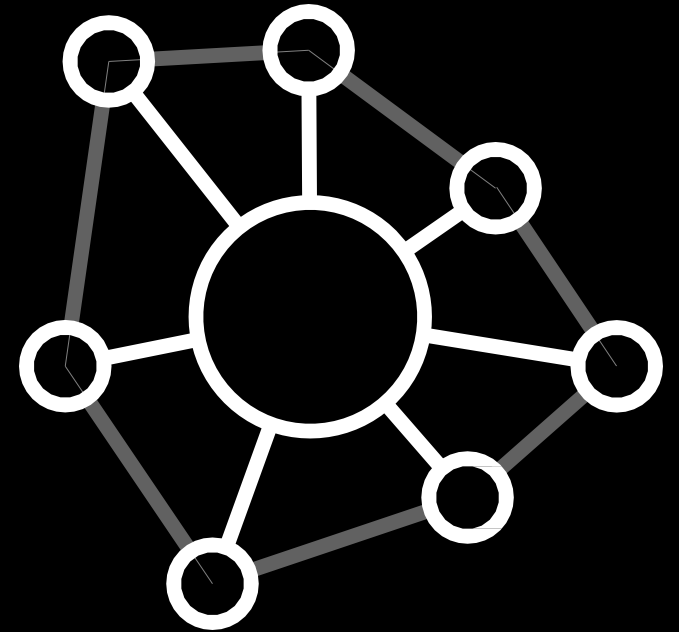


# Federated Internet

*File sharing* — FTP, HTTP

*Chats* — IRC, XMPP

*Messaging* — Email, Fidonet



# Centralized Internet

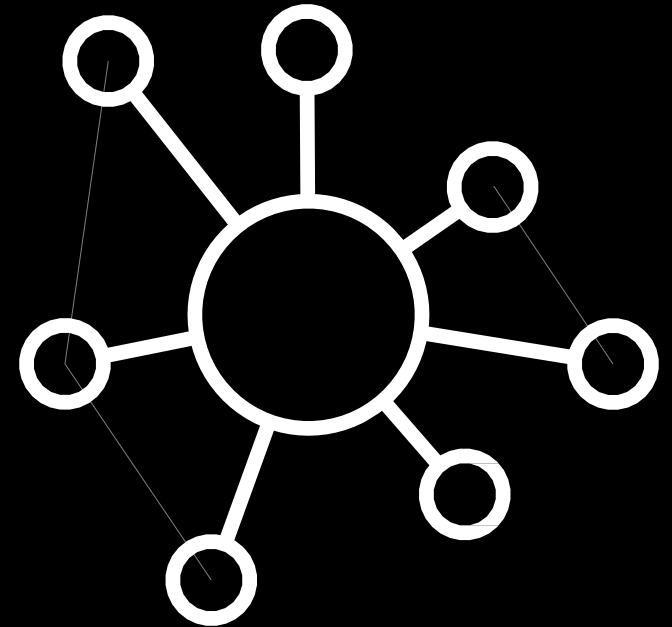
*File sharing* — Dropbox, Google Drive

*Chats* — Slack, Discord

*Messaging* — Facebook, WhatsApp

*Payments* — PayPal

*Code* — GitHub, GitLab, BitBucket





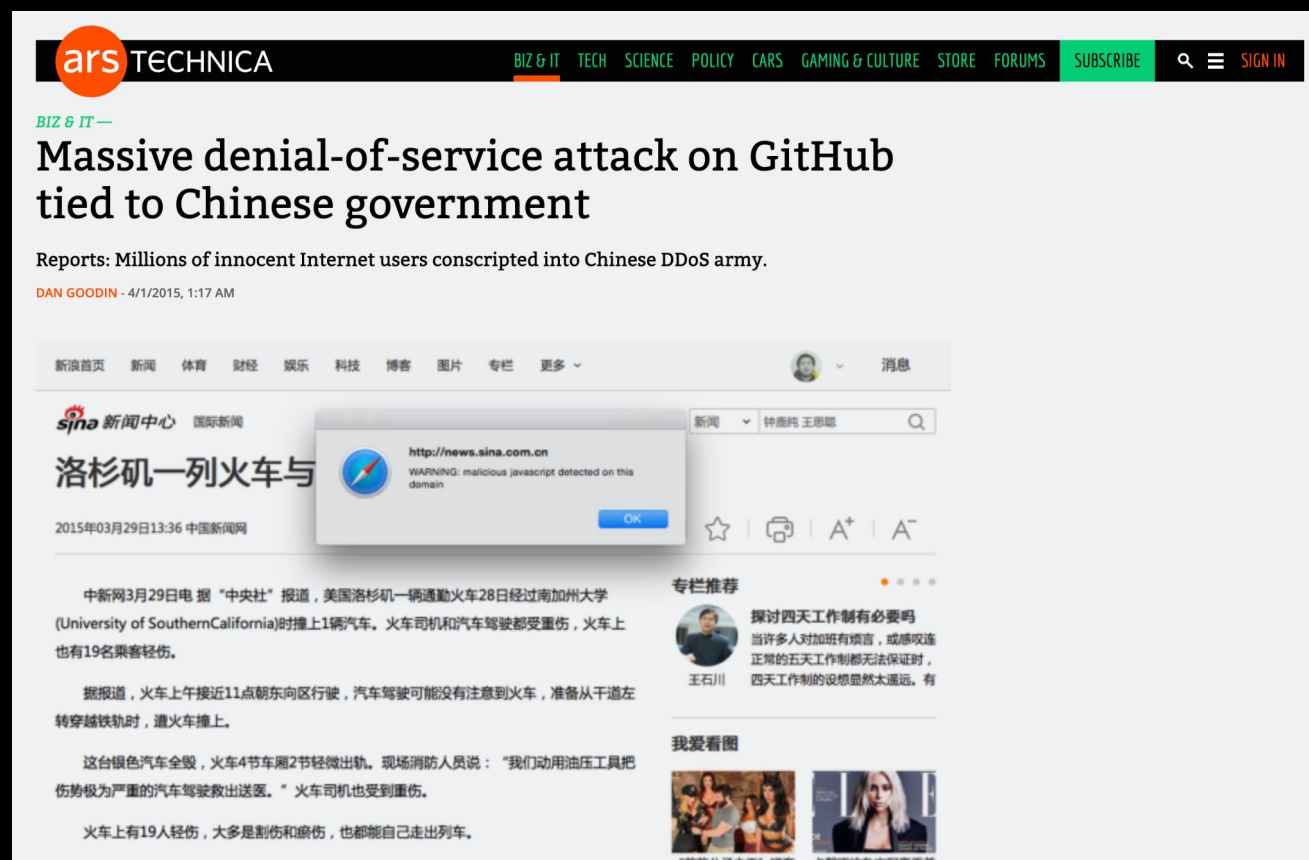
# Demerits of Centralization

Data Leaks

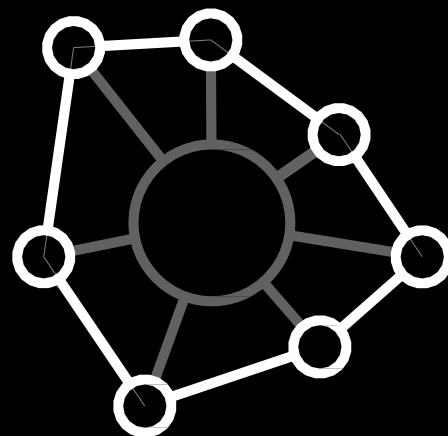
Censorship

Resilience and Availability

Government Surveillance



# A New Hope





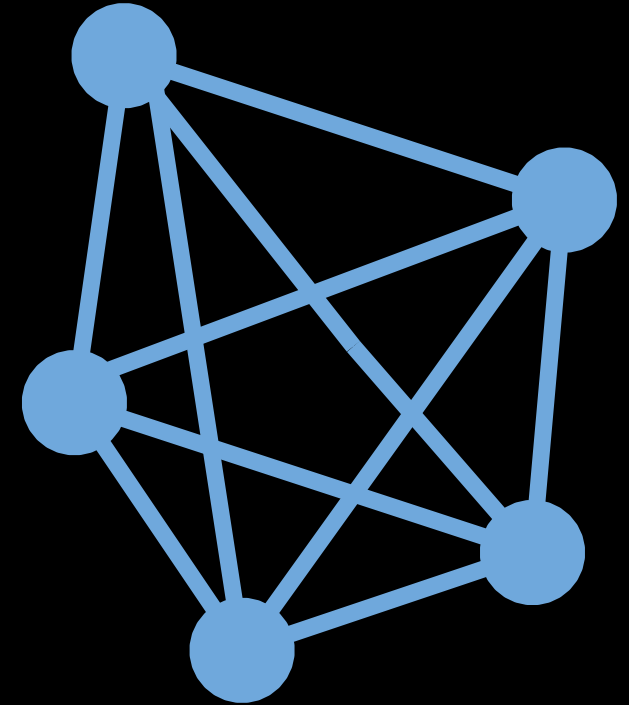


# Peer-To-Peer Distributed Network



# Fundamentals

- Peer-To-Peer communication
- Decentralization of Control
- High Resilience and Low Redundancy
- Maintain a Distributed Ledger



# Re-Decentralization

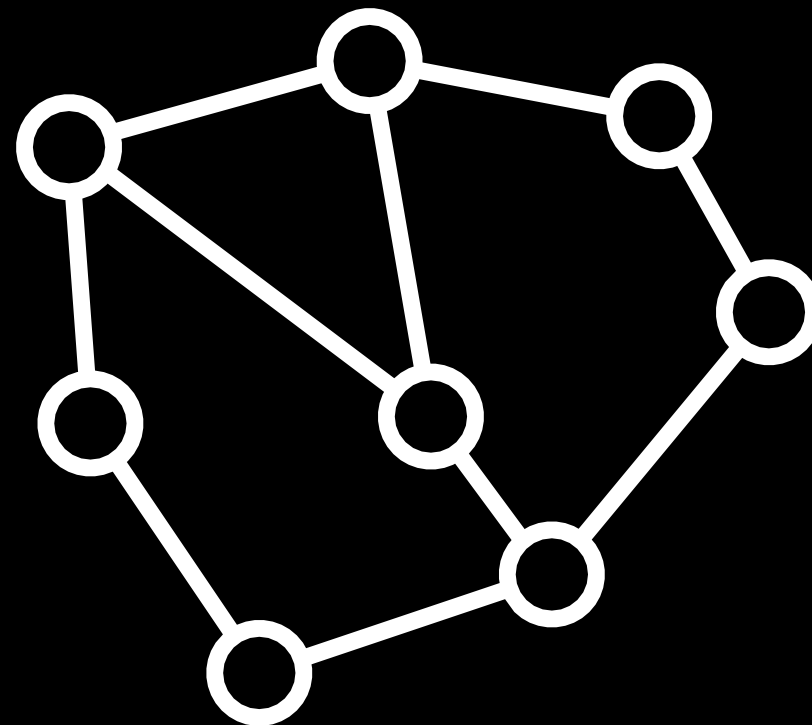
*File sharing* — BitTorrent, IPFS

*Chats* — Matrix

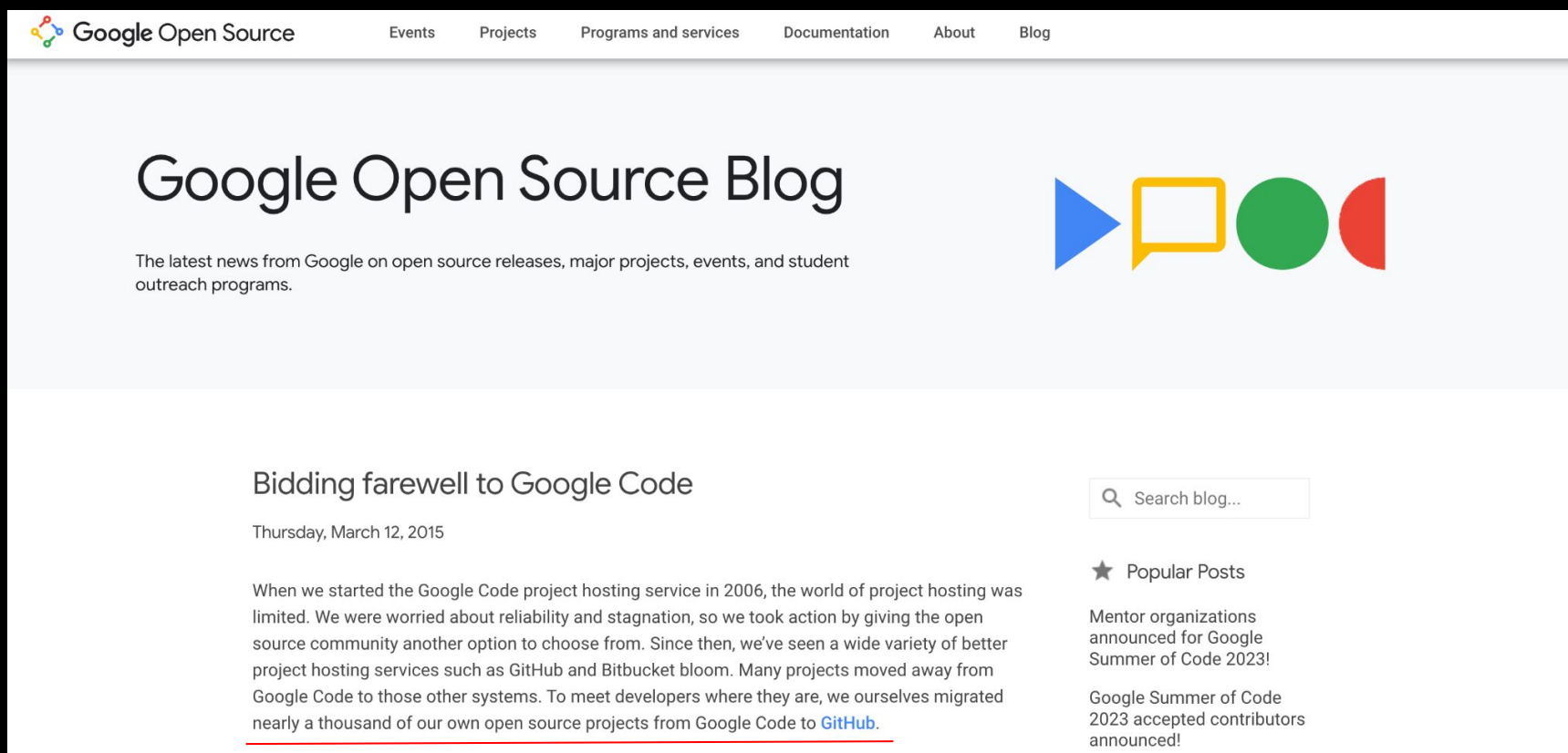
*Messaging* — GNU Ring, Tox

*Payments* — BitCoin, Ethereum

*Code* — Distributed Git =>  
GitTorrent



# Why GitTorrent ?



The screenshot shows the Google Open Source Blog homepage. The header includes the Google Open Source logo and navigation links: Events, Projects, Programs and services, Documentation, About, and Blog. The main heading is "Google Open Source Blog" with a subtext: "The latest news from Google on open source releases, major projects, events, and student outreach programs." To the right of the heading is a graphic of four colored shapes: a blue triangle, a yellow square, a green circle, and a red semi-circle. Below the heading is a featured article titled "Bidding farewell to Google Code" dated Thursday, March 12, 2015. The article text discusses the migration of Google Code projects to GitHub and Bitbucket. To the right of the article is a search bar labeled "Search blog..." and a section titled "★ Popular Posts" with two entries: "Mentor organizations announced for Google Summer of Code 2023!" and "Google Summer of Code 2023 accepted contributors announced!".

Google Open Source

Events Projects Programs and services Documentation About Blog

## Google Open Source Blog

The latest news from Google on open source releases, major projects, events, and student outreach programs.

### Bidding farewell to Google Code

Thursday, March 12, 2015

When we started the Google Code project hosting service in 2006, the world of project hosting was limited. We were worried about reliability and stagnation, so we took action by giving the open source community another option to choose from. Since then, we've seen a wide variety of better project hosting services such as GitHub and Bitbucket bloom. Many projects moved away from Google Code to those other systems. To meet developers where they are, we ourselves migrated nearly a thousand of our own open source projects from Google Code to [GitHub](#).

Search blog...

★ Popular Posts

Mentor organizations announced for Google Summer of Code 2023!

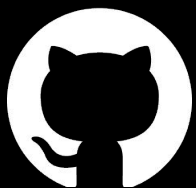
Google Summer of Code 2023 accepted contributors announced!

<https://opensource.googleblog.com/2015/03/farewell-to-google-code.html>

# Why GitTorrent ?

## Practical Reasons

- GitHub's vulnerabilities and potential hacks/ DDoS threats
- GitHub's centralized control over open-source collaboration



# Why GitTorrent ?

## Philosophical Reasons

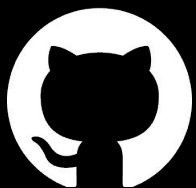
- Free softwares dependency on proprietary tools
- Lack of control and modification options for users



# Why GitTorrent ?

## Ironical Reason

- Shifting from centralized protocols (*CVS, Subversion*) running on multiple servers to decentralized protocols (*DVCS, Git*) running on a centralized GitHub server



# Isn't Git already Decentralized ?

- Comparing Git to FTP, the lack of an index and the inability to turn clients into servers hinder the true decentralization of Git.
- Unlike peer-to-peer protocols like BitTorrent, Git doesn't inherently provide visibility into where repositories are stored or enable direct communication between clients.





# Isn't Git already Decentralized ?

- GitTorrent aims to address this limitation by introducing a decentralized approach, allowing users to locate and clone repositories without relying on a central server.



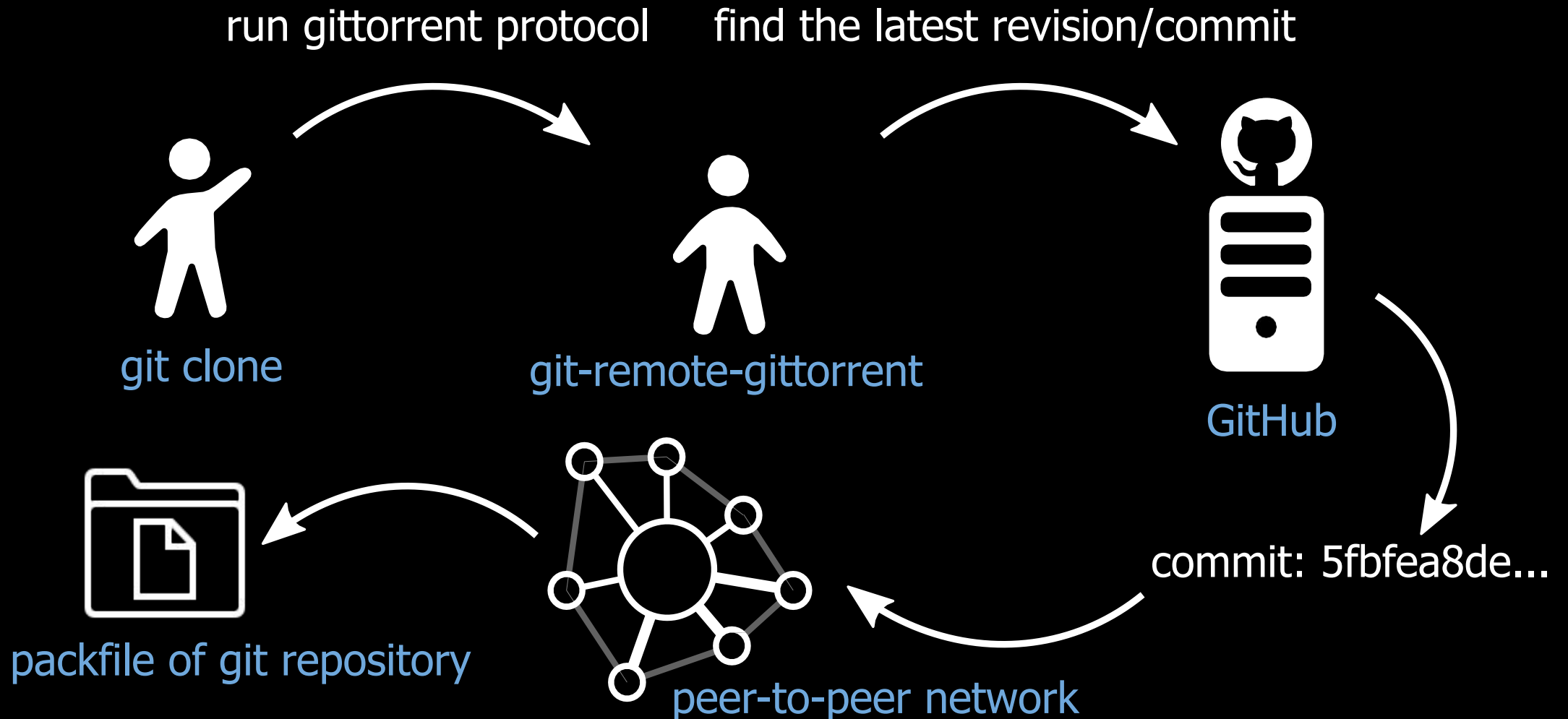


# GitTorrenting a repository hosted on BitTorrent

```
1  git clone gittorrent://github.com/cjb/recursers
2  Cloning into 'recursers'...
3
4  Okay, we want to get: 5fbfea8de70ddc686dafdd24b690893f98eb9475
5
6  Adding swarm peer: 192.34.86.36:30000
7
8  Downloading git pack with infohash:
   9d98510a9fee5d3f603e08dcb565f0675bd4b6a2
9
10 Receiving objects: 100% (47/47), 11.47 KiB | 0 bytes/s, done.
11 Resolving deltas: 100% (10/10), done.
12 Checking connectivity... done.
```



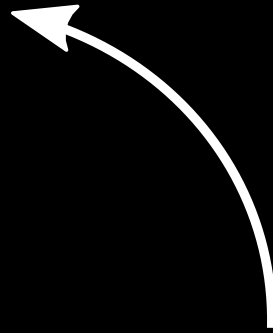
# GitTorrenting a repository hosted on BitTorrent





# GitTorrenting a repository hosted on BitTorrent

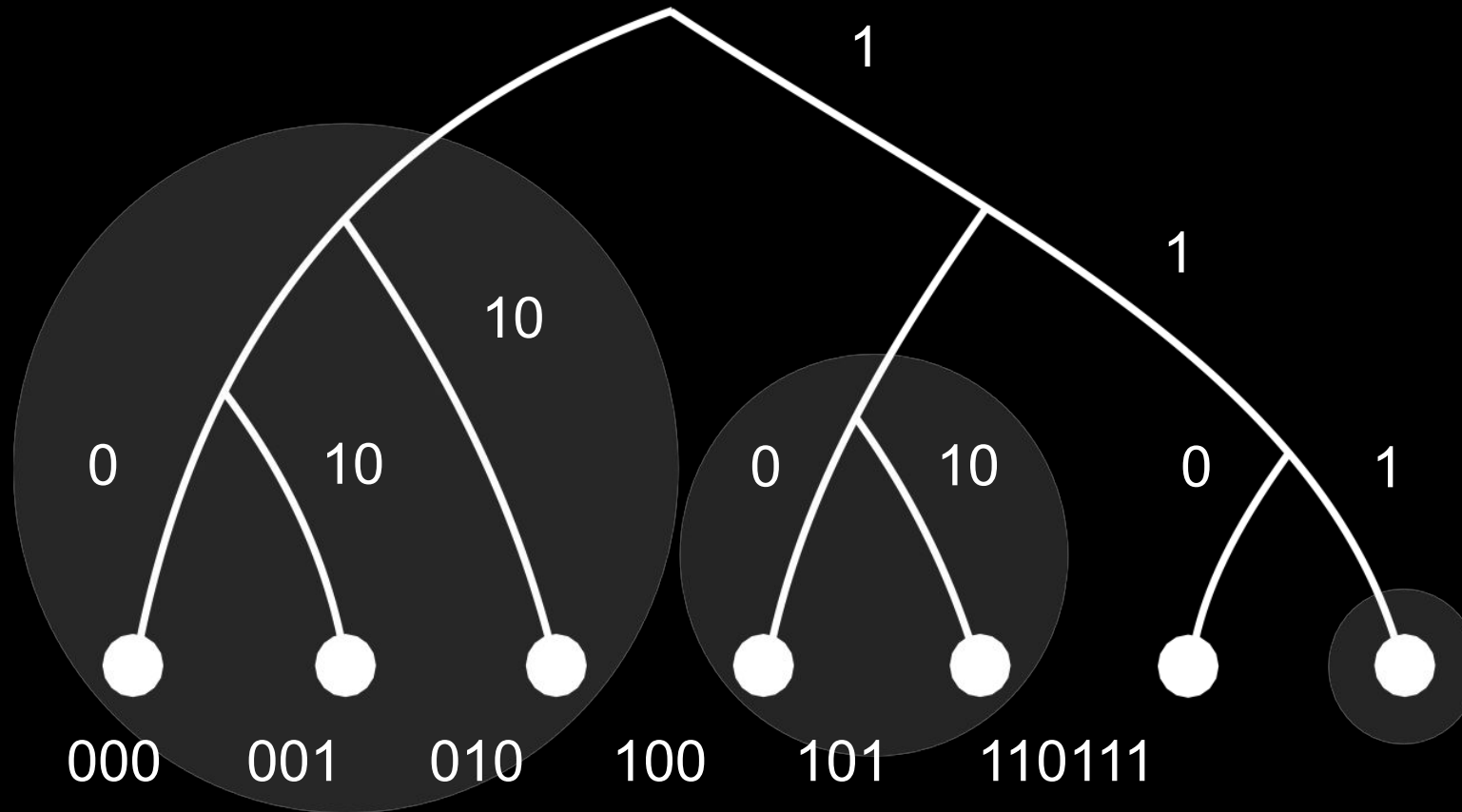
```
get_nodes( '5fbfea8de70ddc686dafdd24b690893f98eb9475' ) =  
[192.34.86.36:30000, ...]
```



list of all peers or the *peer set* that  
can seed that particular commit



# Kademlia Distributed Hash Table



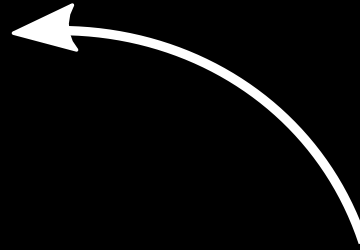


# Removing the GitHub Centralised Dependency

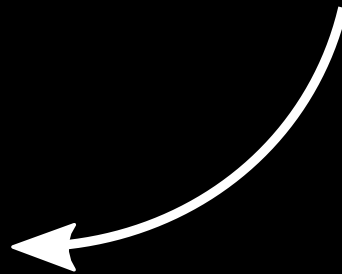
```
// Immutable key put  
hash(value) = put({  
  value: 'some data'  
})
```

```
// Mutable key put  
hash(key) = put({  
  value: 'some data',  
  key: key,  
  seq: n  
})
```

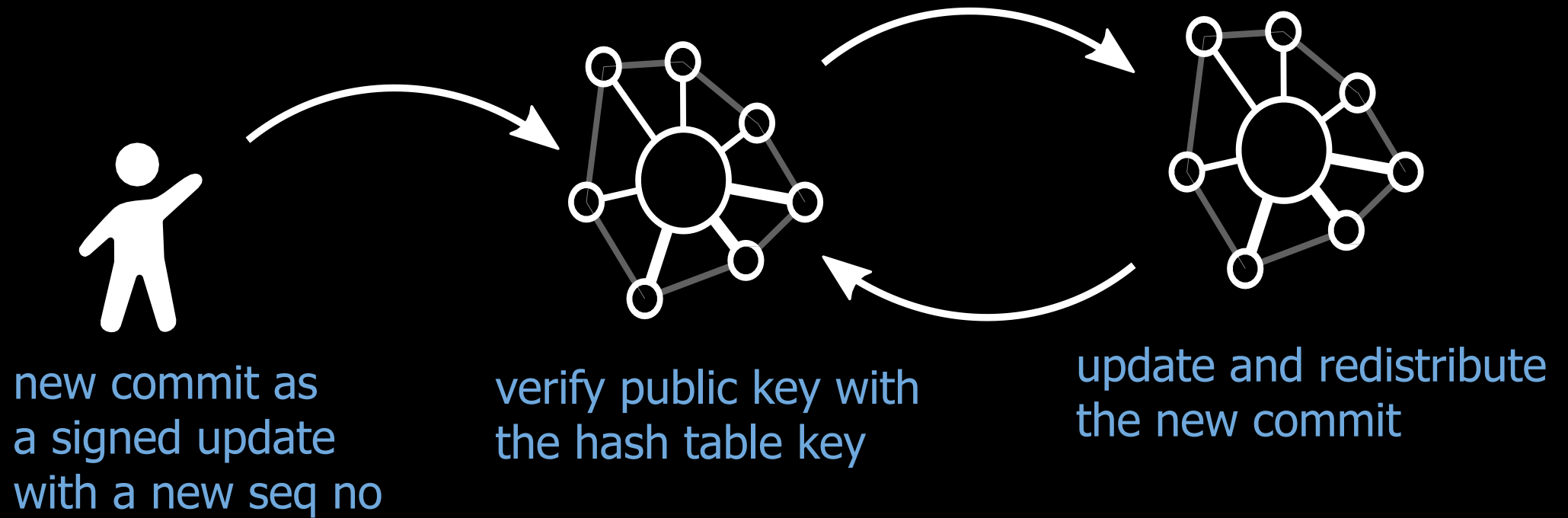
```
// Get  
value = get(hash)
```



each node maintains a  
network-wide key-value store



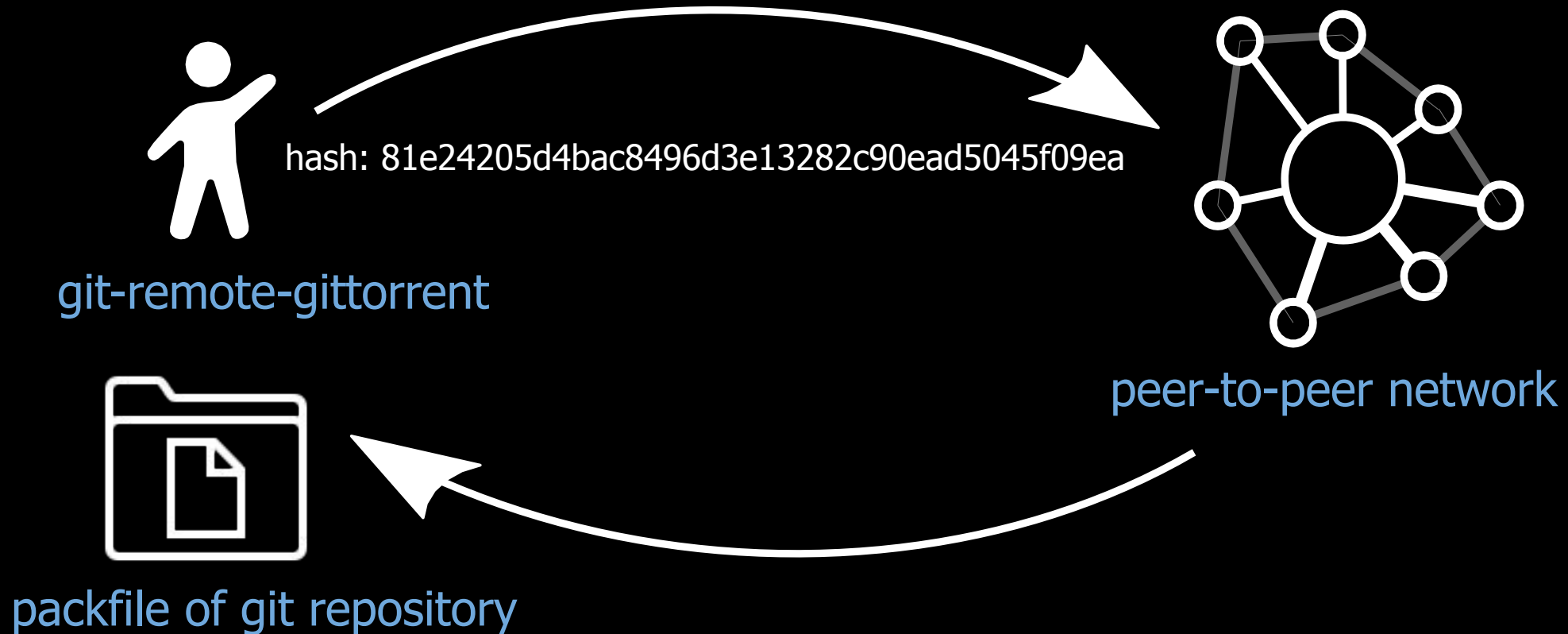
# GitTorrenting a new revision or commit





# GitTorrenting a repository hosted on BitTorrent

run gittorrent client with a hex number that is the hash of author's public key which is used as a mutable key on the distributed hash table







```
1 git clone gittorrent://81e24205d4bac8496d3e13282c90ead5045f09ea/recusers
2
3 Cloning into 'recusers'...
4
5 Mutable key 81e24205d4bac8496d3e13282c90ead5045f09ea returned:
6 name:          Chris Ball
7 email:         chris@printf.net
8 repositories:
9   recusers:
10     master: 5fbfea8de70ddc686dafdd24b690893f98eb9475
11
12 Okay, we want to get: 5fbfea8de70ddc686dafdd24b690893f98eb9475
13
14 Adding swarm peer: 192.34.86.36:30000
15
16 Downloading git pack with infohash: 9d98510a9fee5d3f603e08dcb565f0675bd4b6a2
17
18 Receiving objects: 100% (47/47), 11.47 KiB | 0 bytes/s, done.
19 Resolving deltas: 100% (10/10), done.
20 Checking connectivity... done.
```



# Conclusion



# A global BitTorrent swarm of Git objects

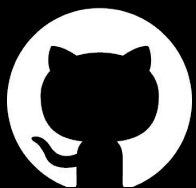
```
git clone https://github.com/cjb/foo
```

```
git clone gittorrent://github.com/cjb/foo
```

```
git clone gittorrent://81e24205d4bac8496d3e13282c90ead5045f09ea/foo
```

# GitTorrent Limitations

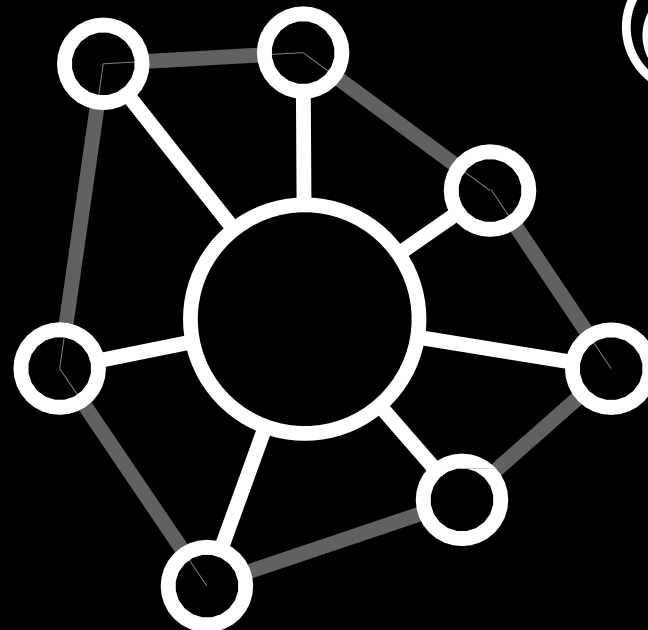
- Doesn't implement GitHub Comments, Issues, Discussions
- Doesn't implement Pull Request and collaborative workflow
- Seeders should be rewarded for being a part of network
- DHTs support is limited



# GitTorrent Future Work

- Distributed revision control systems for bug tracking - *Bugs Everywhere*
- Use IPFS (*InterPlanetary File System*) instead of BitTorrent swarm

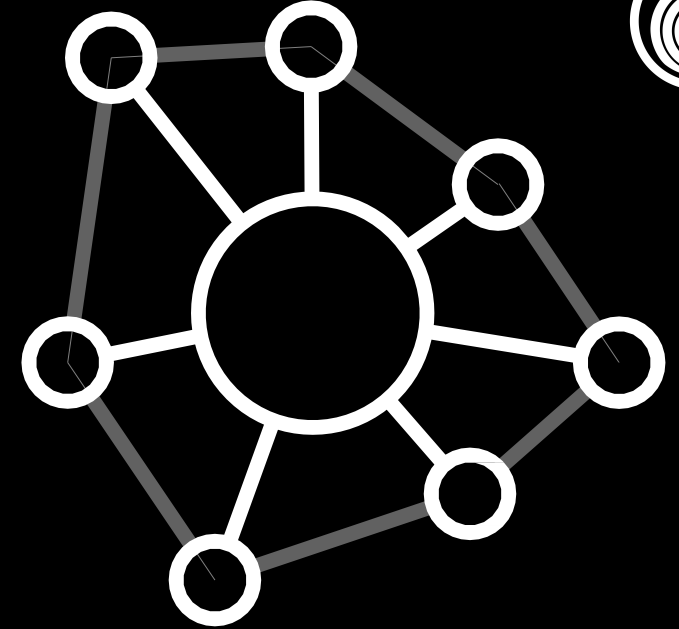




# References

- <https://blog.printf.net/articles/2015/05/29/announcing-git-torrent-a-decentralized-github/>
- <https://github.com/cjb/GitTorrent>
- <https://lwn.net/Articles/646628/>
- <https://news.ycombinator.com/item?id=9625840>





# Thank you

<https://github.com/sanam2405/seminar>

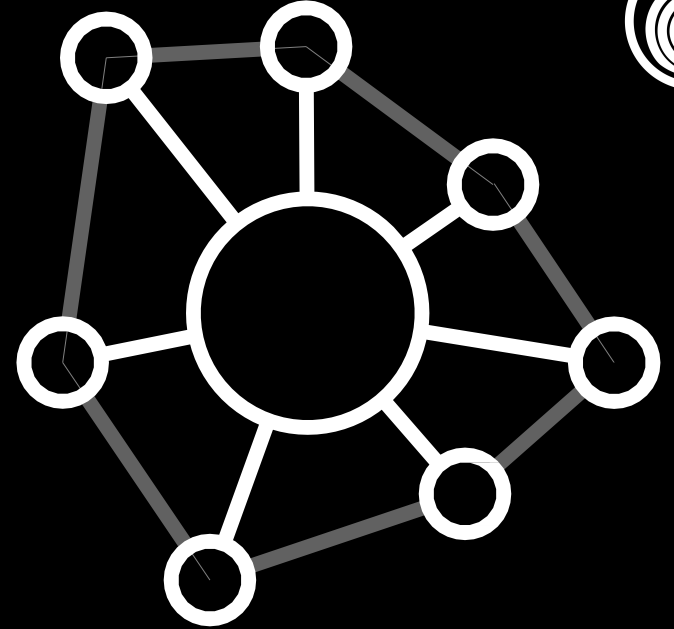
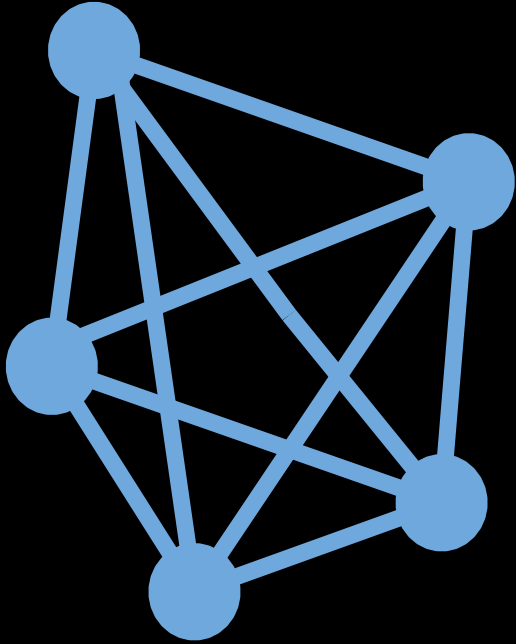
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Questions ?

