Cypherpunks write code

Hacking on Tor related projects

$ whoarewe

Arturo “hellais” Filastò

- Working mainly on censorship detection and measurements (OONI)
- A Random GlobaLeaks Developer

Aaron “aagbsn” Gibson

- Working mainly on the Tor infrastructure
- Bridge distribution
- Anti-censorship related issues

What does the Tor Project do?

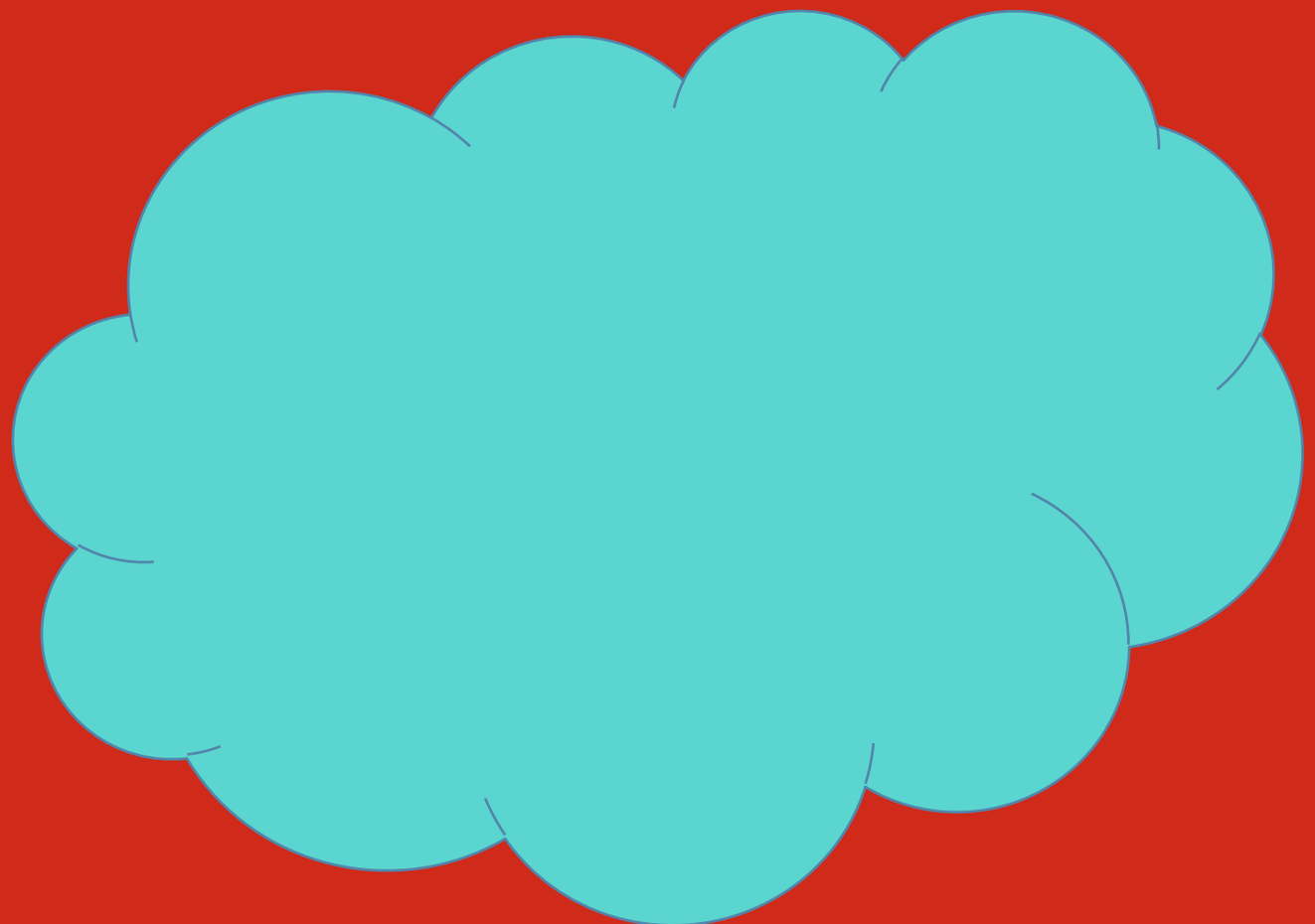
- Help people access information Anonymously (Tor)
- Help people publish information Anonymously (Tor Hidden Services)
- Help people circumvent censorship (Bridges, Obfsproxy)
- Measure censorship across the world (OONI)

A brief intro

Some of the lesser known parts of the Tor Network

The Tor Architecture

Tor Client

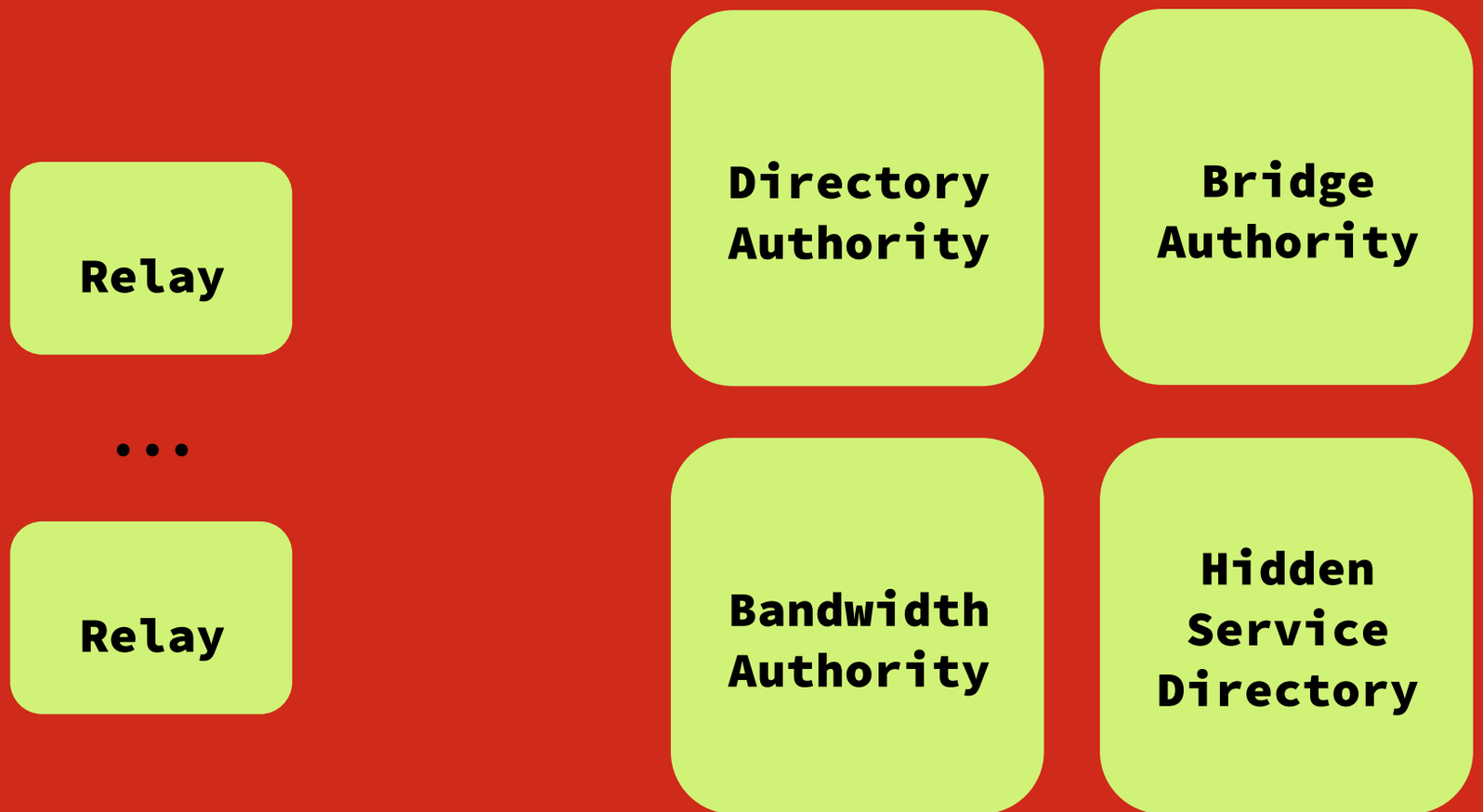


The Tor Architecture

Tor Client

Relay	Relay	Relay
Relay	Relay	Exit Relay
Relay	Relay	Exit Relay

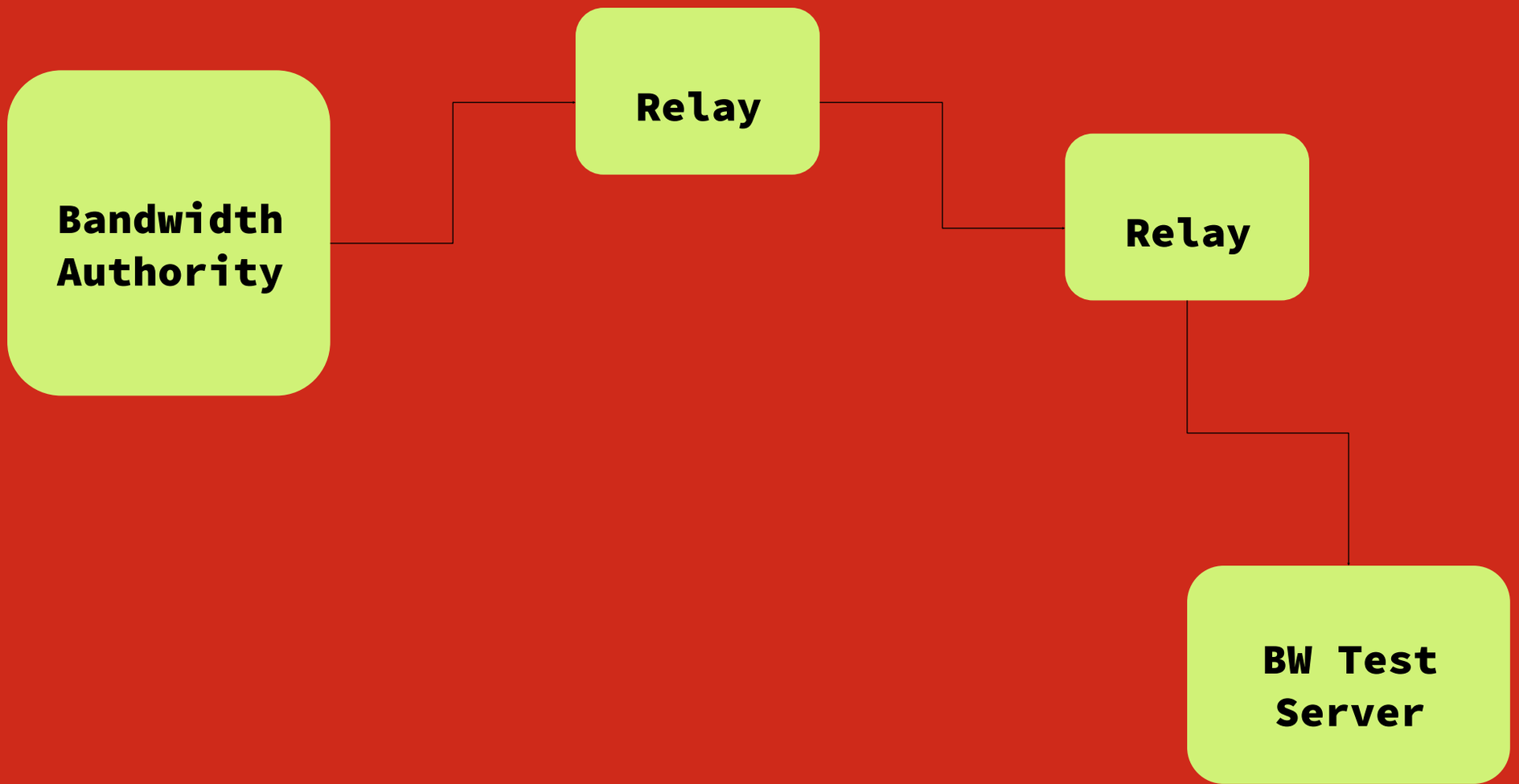
The Tor Architecture



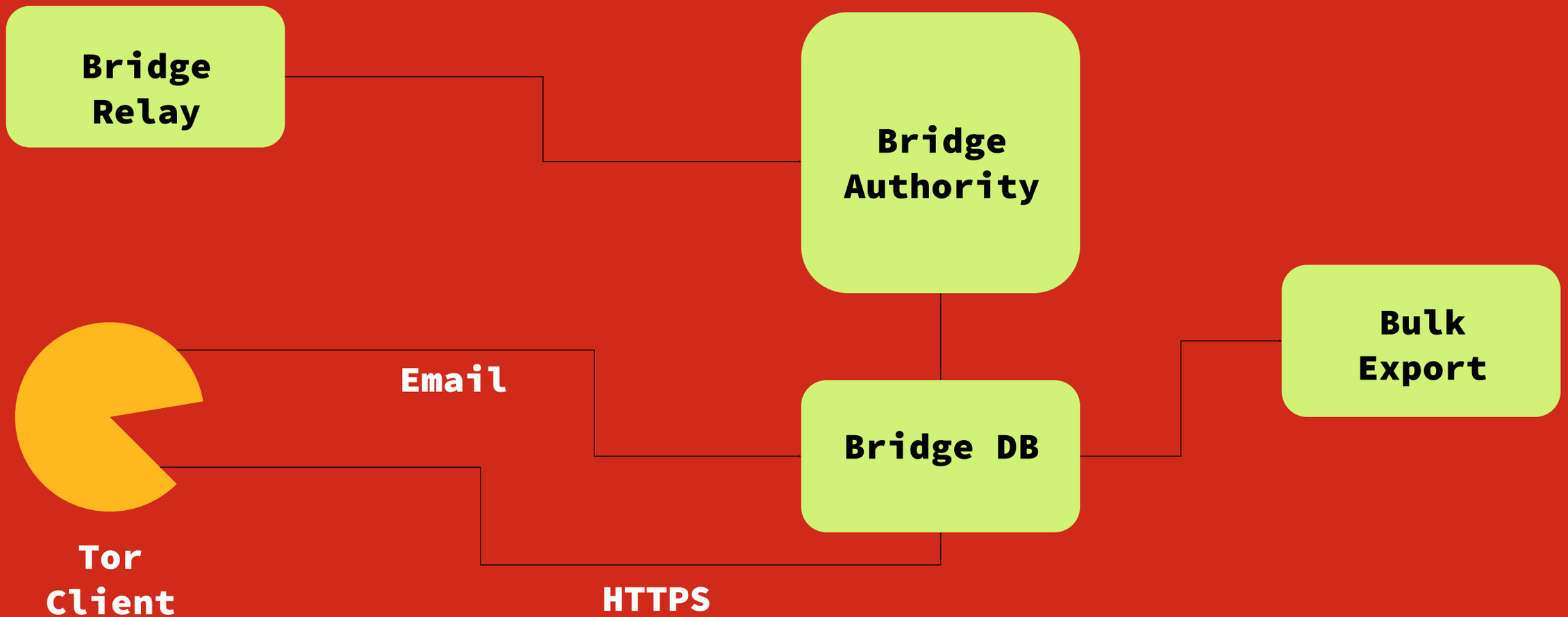
Directory Authority

- There are currently 9 Directory Authorities
- The core ones are shipped with every Tor binary
- Used as root of trust
- Discovery of the network
- DA’s vote on stuff

Bandwidth Authority



Bridge Authority



Projects

Hope some will excite you!

Tor Button

- Is a Firefox extension that torifies your connections
- Currently Tor Button is a component of Tor Browser Bundle and should not be used as a standalone plugin.
- https://www.torproject.org/torbutton/en/design/

TorBirdy

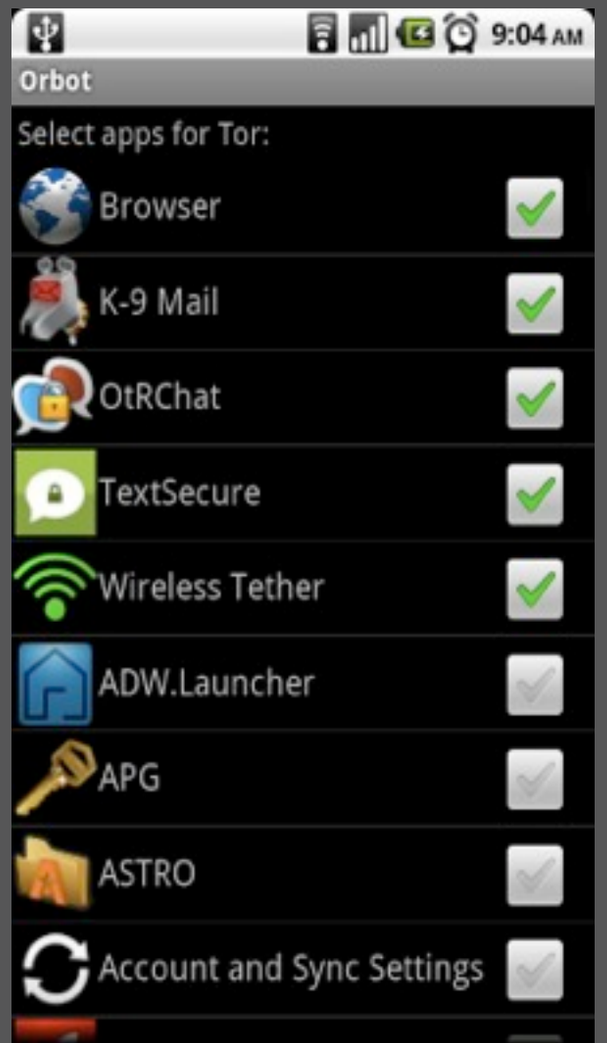
- Used to torify Thundebird
- It’s a Thunderbird Extension
- https://github.com/ioerror/torbirdy
- There are some open tickets in ThunderBird bug tracker

Vidalia

- Written in C++
- Based on QT
- Is the default Tor GUI

Orbot

- Written in Java
- Android Tor controller allowing you to Torify apps on your phone



Tor Browser Bundle

- Vidalia + Tor Button + Firefox + Build automation
- Includes patches for Firefox (some of which are not going to be merged upstream ☹)

Arm

- An ncurses based interface to Tor
- Written in Python
- Based on Stem

txtorcon

- Written in Python
- Based on Twisted
- Provides functionality for interacting with the Tor Control port, starting and stopping of Tor clients, Hidden Services.
- All providing nice Twisted compatible interfaces

Atlas

- Is used to search and view details on Tor relays
- Written in Javascript
- Based on Backbone.js and require.js

Onionoo

- Provides the backend HTTP API to Atlas
- Written in Java
- There is also a WIP version of Onionoo called **PyOnionoo** written in Python based on Twisted (cyclone)

Metrics Portal

- Written in Java, R and Python
- Used to generate all the statistics and charts you see on metrics.torproject.org

TorFlow: Bandwidth Authority

- Builds 2 hop circuits through relays of similar capacity and measures throughput
- Implements PID feedback
- Results are fed to a corresponding Directory Authority
- Directory Authorities advertise the media bw value as the consensus bw
- Clients probabilistically select higher capacity relays

TorFlow: Exit Authority

- Detects content manipulation
  - Of HTTP, HTTPs, SSH, DNS
- Builds circuits through all Tor Exits and compares content
- Misbehaving exits are flagged
- Pitfalls: Does not scan dynamic websites

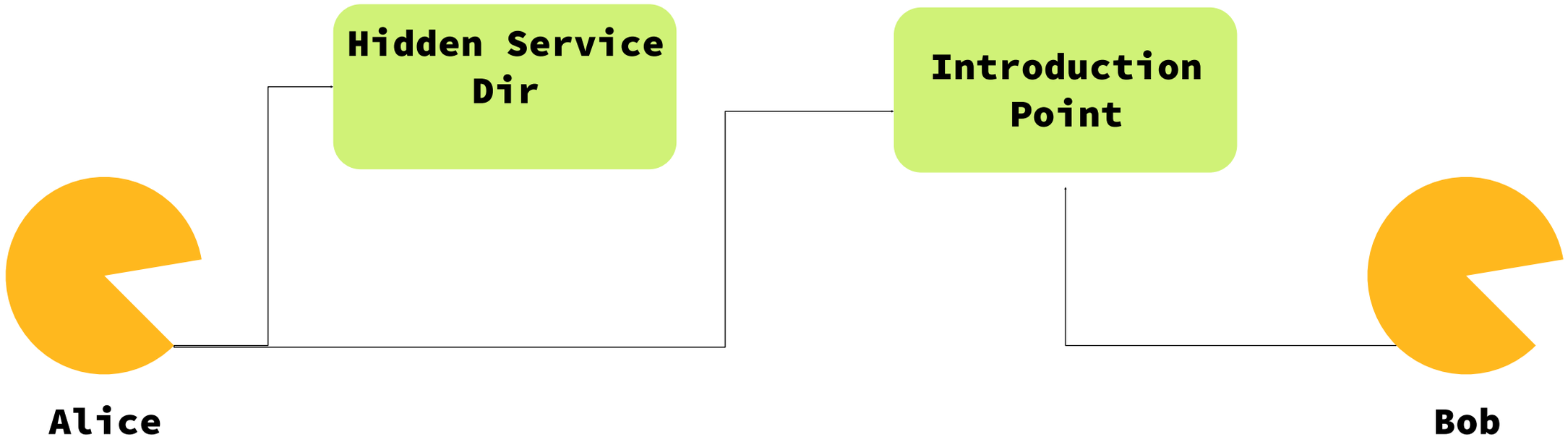
TorFlow: Other

- OpAddon, metatroller - modify Tor's path selection policy
- WARNING: May compromise your anonymity
- PathBias - Tools for measuring path bias

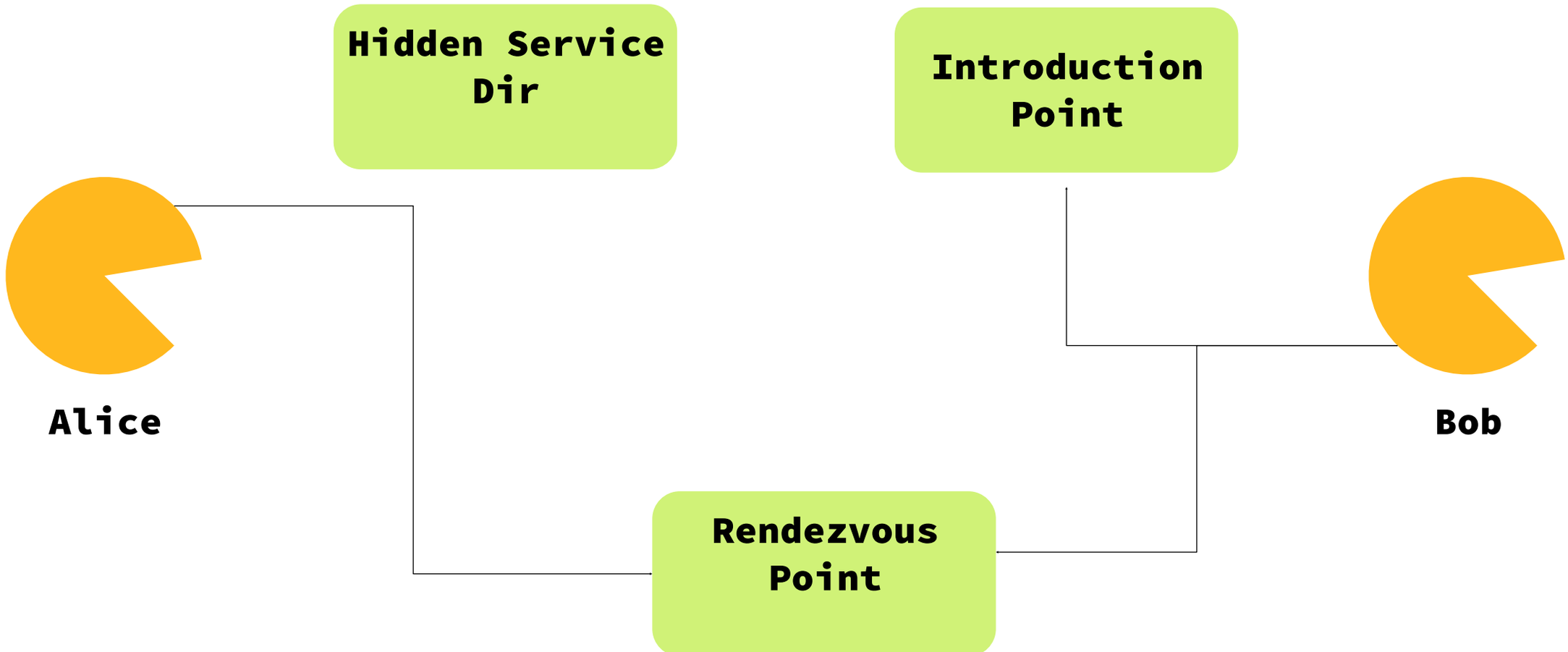
Tor Hidden Services

- Allows you to anonymously host server-side TCP services
- The .onion address is self authenticating
- Opens lot’s of possibilities for self publishing

Tor Hidden Services



Tor Hidden Services



APAF: Anonymous Python Application Framework

- Written in Python
- Based on Twisted and Storm
- A build system for creating desktop oriented, Tor Hidden Service driven, python based server side applications

APAF: Anonymous Python Application Framework

- UI Related issues: https://github.com/globaleaks/APAF/issues?labels=UserInterface&page=1&state=open
- Security related issues: https://github.com/globaleaks/APAF/issues?labels=Security&page=1&state=open
- Enhancements: https://github.com/globaleaks/APAF/issues?labels=enhancement&page=1&state=open

Tor2web

- Makes HTTP based Tor Hidden Services accessible from the “surface web”
- Provides no anonymity for the client, but stills maintains anonymity for the publisher
- Written in Python
- Based on Twisted
- Some critical bugs:
  - Currently Internet Explorer does not work with tor2web

Shadow

- Simulates the Tor network
- Useful for testing and measurements
- Written in C
- Based on foo and bar

Tor and Censorship

- Tor is born as an Anonymity Tor
- Censorship circumvention is a side effect

Timeline of Tor censorship

- 2002 - Tor Source code released
- 2006 (April), Thailand - DNS filtering of tpo
- 2006, Websense/netfilter - Block Tor based on GET requests to Das
- 2007, Iran, Saudi - Block Tor thanks to Websense
- 2009, Iran throttles SSL
- 2009, Tunisia - Smartfilter to block all expect 443 and 80
- 2009, China blocks public relays
- 2009, Tor Bridges are introduced
- 2010, China starts collecting and blocking bridges
- 2011, Iran by DPI on DH parameters of SSL
- 2011, Egypt selected targeted sites for
- 2011, Lybia throttling to limit use
- 2011, Syria, DPI on Tor's TLS renegotiation and killed connections
- 2011, Iran DPI on SSL and TLS certificate timeline
- 9 February 2012, Iran total SSL blockage
- 2012, China proactive censorship
- February - March 2012, Kazhakistan
- 22 May 2012, Ethiopia
- 25 June 2012, UAE Tor blocking via DPI
- Learn More: https://trac.torproject.org/projects/tor/wiki/doc/OONI/censorshipwiki/

OONI-probe

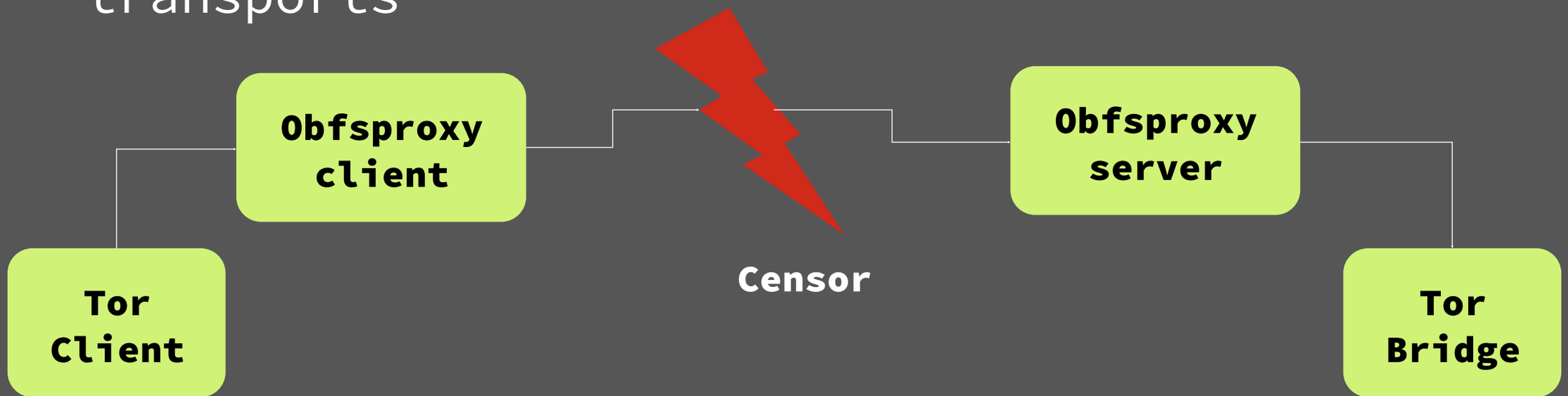
- Written in Python
- Based on Twisted and Scapy
- It aims at answering the questions:
  - What is censored?
  - Where is it censored?
  - How is it censored?

Tor Cloud

- The purpose is to simplify the setup of Tor Bridges

Obfsproxy

- A framework for creating pluggable obfuscated transports



Obfsproxy

- Useful for allowing Tor to circumvent censorship
- The bridge you are using must support your desired obfsproxy transport
- Written in C
- Based on libevent

BridgeDB

- Written in Python
- Uses Twisted
- Collects bridges and hands them out to clients
- It hands them out through distributors
  - Currently HTTPS, email and export to list

What next?

Come hack with us!

- We will have a hacking session in the workshop room, ping us if you are digging it!

- Join us on IRC: irc.oftc.net #tor-dev
- Subscribe to the tor-dev and tor-talk mailing lists

Thanks for Listening!

Questions?