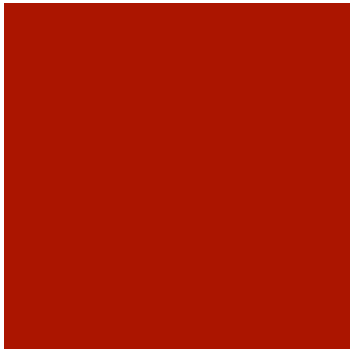
SAPIENZA
UNIVERSITÀ DI ROMA

Giovanni Stilo, Ph.D.
stilo@di.uniroma1.it

Chasing the White Rabbit

Simple Crawling principles

Requirements



- Curiosity!
- Network Principles
  - TCP/IP protocol
  - HTTP protocol
  - DNS
- W.W.W. Principles
  - Html language
  - JavaScript language
- IR background
- UML (highly recommended)
- Design Pattern (highly recommended)
- Maven 2 (Optional)

Web *

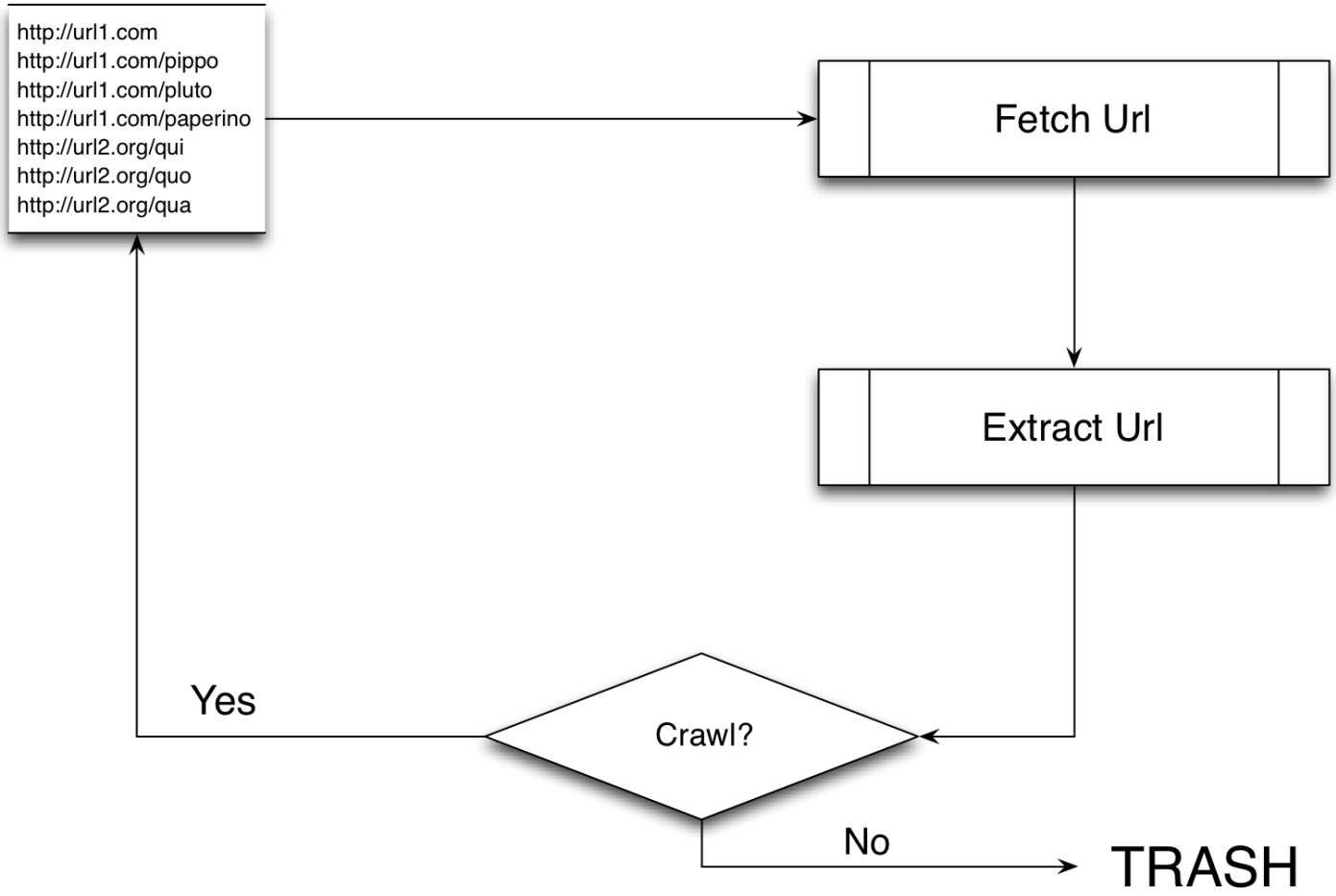
- A **Web crawler** is an Internet bot that systematically *browses* the World Wide Web, typically for the purpose of Web indexing.
- **Web indexing** refers to various methods for indexing the contents of a website or of the Internet as a whole. Web indexing is also becoming important for periodical websites.
- **Web scraping** (web harvesting or web data extraction) is a computer software technique of extracting information from websites. Such software programs simulate human exploration of the World Wide Web.

Web Crawler

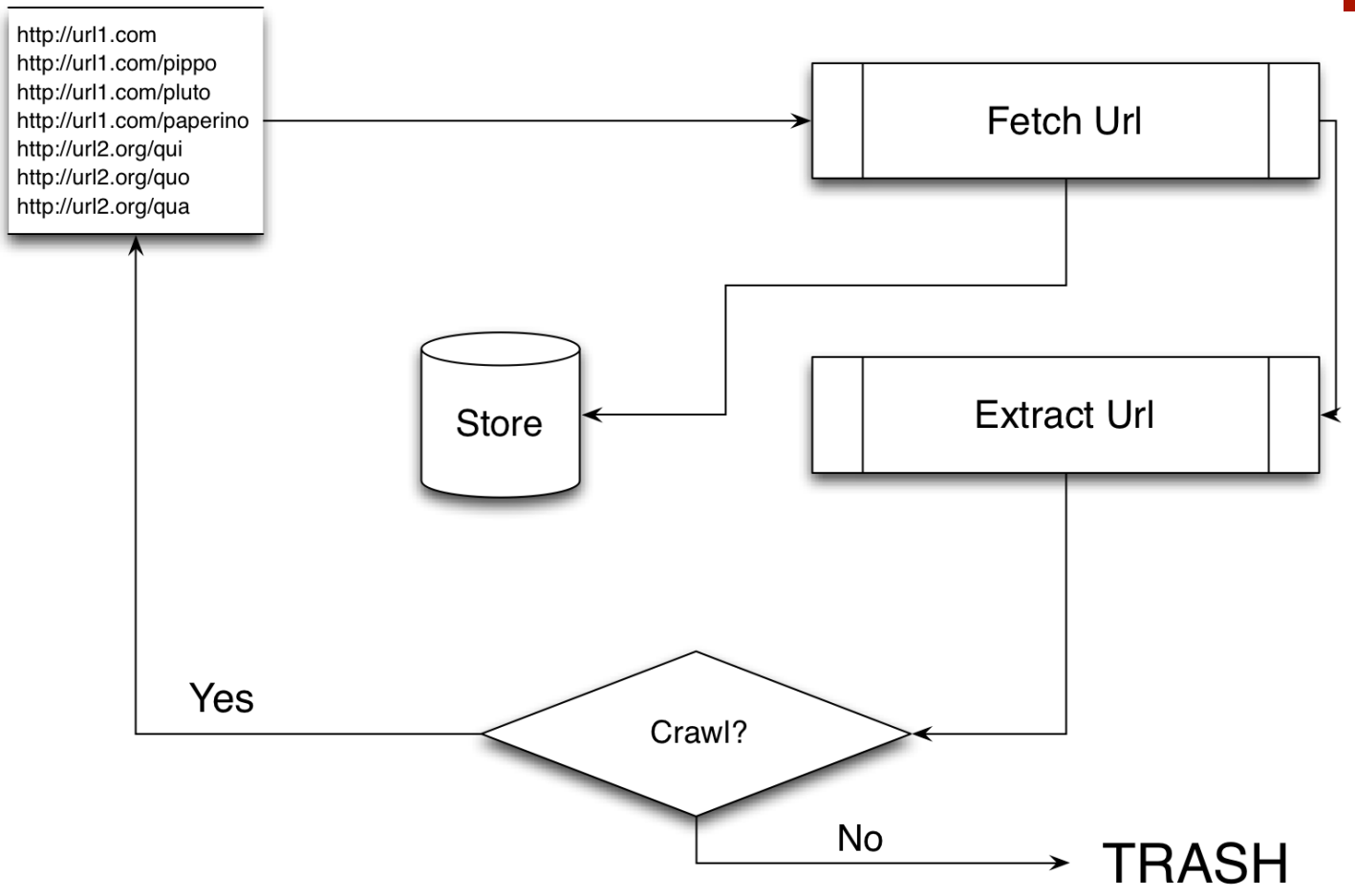
- A Web crawler starts with a list of URLs to visit, called the ***seeds***.
- As the crawler visits these URLs, it identifies all the hyperlinks in the page and adds them to the list of URLs to visit, called the ***crawl frontier***.
- URLs from the frontier are recursively visited according to a set of ***policies***.

- **GREAT! LOOKS SIMPLE!**

Simple Crawler



Crawler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http://url1.com/pippo
http://url1.com/pluto
http://url1.com/paperino
http://url2.org/qui
http://url2.org/quo
http://url2.org/qua
Fetch Url
Store
Extract Url
Yes
Crawl?
No
TRASH

Facts

- **634 million –** Number of websites (December).
- **51 million –** Number of websites added during the year.
- **87.8 million –** Number of Tumblr blogs..
- **59.4 million –** Number of WordPress sites around the world.
- **35% –** The average web page became this much larger during 2012.
- **4% –** The average web page became this much slower to load during 2012.
- **~45 billion** pages indexed by Google

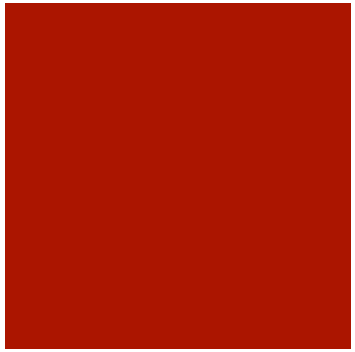
Issues

- The large volume implies that the crawler can only download a limited number of the Web pages within a given time, so it needs to prioritize its downloads. The high rate of change implies that the pages might have already been updated or even deleted.
- Edwards *et al.* noted, "Given that the bandwidth for conducting crawls is neither ***infinite nor free***, it is becoming **essential** to crawl the Web in not only a scalable, but efficient way, if some reasonable measure of quality or freshness is to be maintained."
- A crawler **must carefully** choose and how at each step which pages to visit next.

Related

- A crawler must not only have a **good crawling strategy**, as noted in the previous sections, but it should also have a **highly optimized architecture**.
- While it is *fairly easy to build a slow crawler* that downloads a few pages per second for a short period of time, building a high-performance system that can download hundreds of millions of pages over several weeks presents **a number of challenges** in system design, I/O and network efficiency, and robustness and manageability.

Excercise



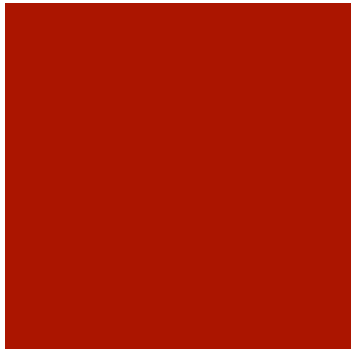
Realize the **Design** of a Crawler

Be abstarct as much as possible considering all future possible operation.

For example you need:

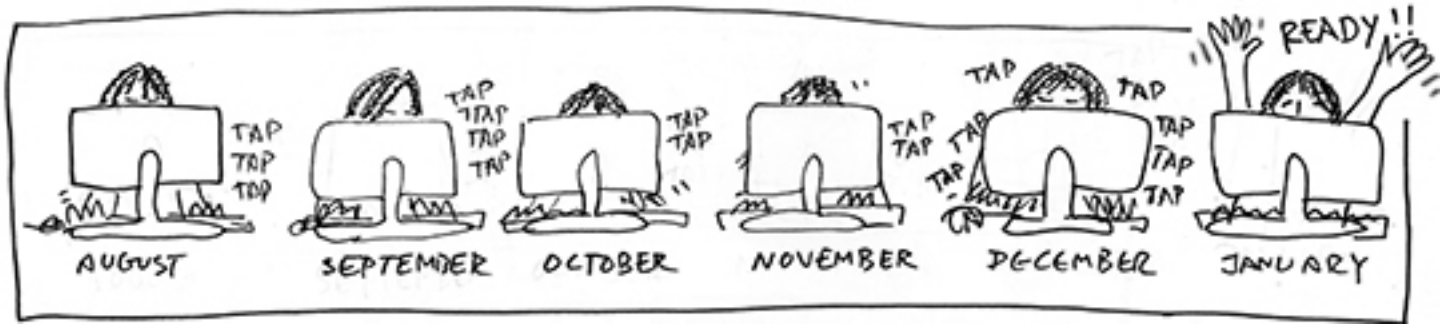
- **Url Manager ?**
- **Fetcher ?**
- **Action Manager ?**
- **… ?**
- **… ?**
- **… ?**

Users Crawling



- It is possible to work in the same way of a crawler work over every network/graph.
- For example we should crawling users of a Social Network. How?
  - seeds = list of starting user to crawl
  - extracted url = list of friends/follower
  - At each step you crawl a new user and relative information like normally get a web-page.
- It is possible to find the problems during the users crawling. So should be useful:
  - Maintainng a list/map of visited users
  - Create a queue of users to download
  - Perform some kind of operation over downloaded data (store…).

Let's Try?!?!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DECEMBER
READY!!
JANUARY