CS4051

Information Retrieval

Week 14

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Web Crawler

Chapter No. 20

Web Crawler

- Web crawling is the process by which we gather pages from the Web to index them and support a search engine.
- The objective of crawling is to quickly and efficiently gather as many useful web pages as possible, together with the link structure that interconnects them.
- web crawler is sometimes referred to as a spider.

Feature a Crawler MUST provide

- Robustness: The crawler must be robust to deal with a large number of linked pages from a website. Sometime server traps a crawler, the crawler must identify these traps.
- Politeness: Web servers have both implicit and explicit policies regulating the rate at which a crawler can visit them. These politeness policies must be respected.

Feature a Crawler Should provide

- Distributed: The crawler should have the ability to execute in a distributed fashion across multiple machines.
- Scalable: The crawler architecture should permit scaling up the crawl rate by adding extra machines and bandwidth.
- Performance and efficiency: The crawl system should make efficient use of various system resources including processor, storage, and network bandwidth.

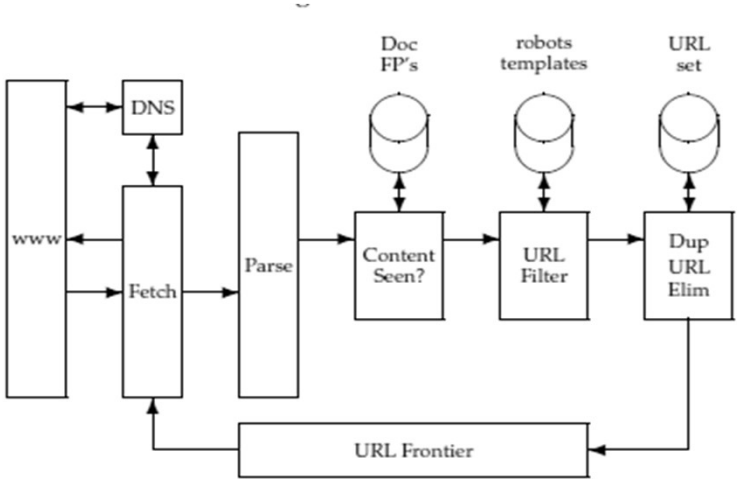
Feature a Crawler Should provide

- Quality: Given that a significant fraction of all web pages are of poor utility for serving user query needs, the crawler should be biased toward fetching “useful” pages first.
- Freshness: In many applications, the crawler should operate in continuous mode: It should obtain fresh copies of previously fetched pages.

Feature a Crawler Should provide

- Extensible: Crawlers should be designed to be extensible in many ways – to cope with new data formats, new fetch protocols, and so on. This demands that the crawler architecture be modular.

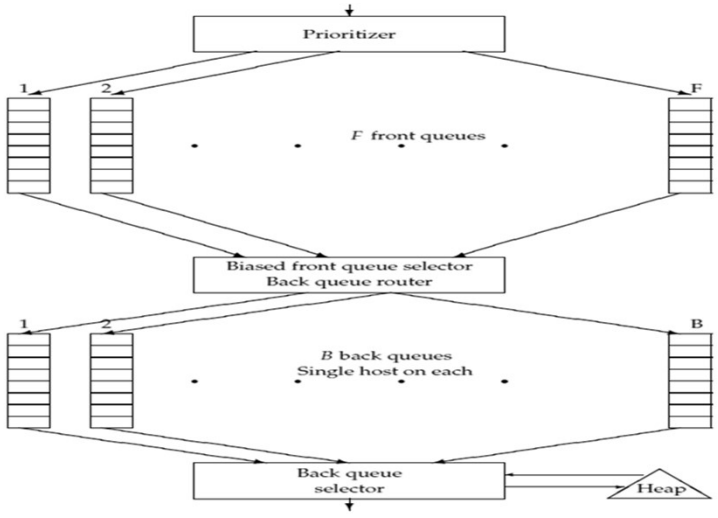
Architecture of a Crawler



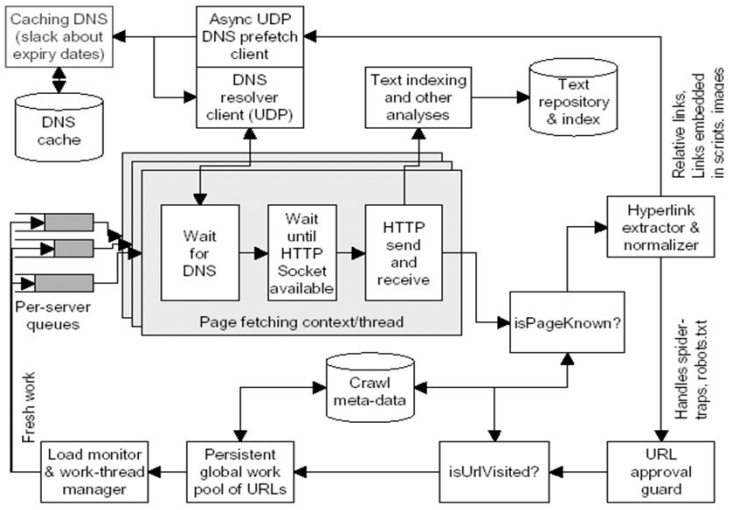
Architecture of a Crawler

- URL Frontier: containing URLs yet to be fetches in the current crawl. At first, a seed set is stored in URL Frontier, and a crawler begins by taking a URL from the seed set.
- DNS: domain name service resolution. Look up IP address for domain names.
- Fetch: generally use the http protocol to fetch the URL.
- Parse: the page is parsed. Texts (images, videos, and etc.) and Links are extracted.

URL frontier



Typical Crawler



Architecture of a Crawler

- Distributed Indexes
  - By term (global Indexes)
  - By document (Local Indexes)
- Connectivity Server
  - URL are transformed into Integers values
  - In-Link and Out-Link states are maintained.
  - Ordering of URL based on Host, lexicographic ordering, etc