Content Delivery Network

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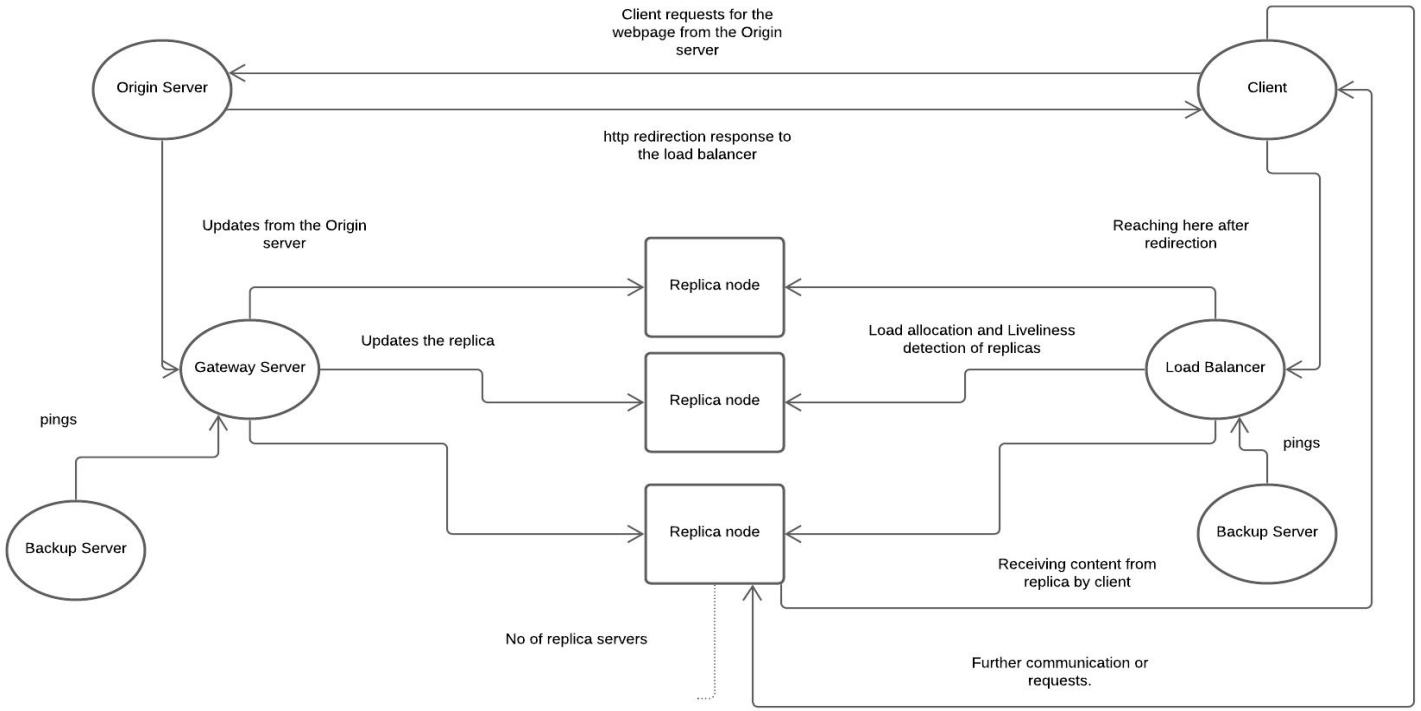
- Content - Directory file structure
- Assumptions :-
    1. Reliable connections
    2. Only crash faults
- System components :-
    1. Origin Server
    2. Gateway server
    3. Gateway backup server
    4. CDN Replicas
    5. Client

Architecture :-



Features :-

- Content Provider:
  1. Can upload content to the CDN.
  2. Can make updates to the content.

- End user:
  1. Can see the webpages as if no CDN is involved.

- Scalability: can handle addition of new replicas

- Fault Tolerance: 3 replicas & a backup Gateway Server

- Rational Load balancing

Implementation details :-

Client:

- It first sends a request to the origin.
- Then the origin redirects it to the Load Balancer.
- The Load Balancer chooses the Replica Server with the least load and redirect the client request to the Replica Server.
- It then receives the required files.

Implementation details :-

Origin Server:

- It is open to requests from clients, replicas and the backup gateway server (on three different ports).
- On receiving any message on the Client_listen port, the origin sends the address of the LB.
- On receiving any request from the replica for a file, it asks for the file name and sends the file if it is present.
- It also checks for any messages from the new Gateway server (if the old one has crashed) and updates its corresponding information about the Gateway server.

Implementation details :-

Gateway Server :

- It has three functions: 1. Load Balancing, 2. Handling new replicas and Gateway. 3. Sending snapshots to Backup.
- Load Balancing: It asks for the load on each Replica servers in regular intervals.
- On a request from the client, it assigns the one with the least load.
- Handling New Replica: Whenever a new replica is added (or an old replica has recovered), the Gateway updates it in its replica list and sends the updated list to the origin.
- The backup periodically asks for snapshots, it replies the current status as the snapshot to backup gateway server.

Implementation details :-

Backup Gateway Server :

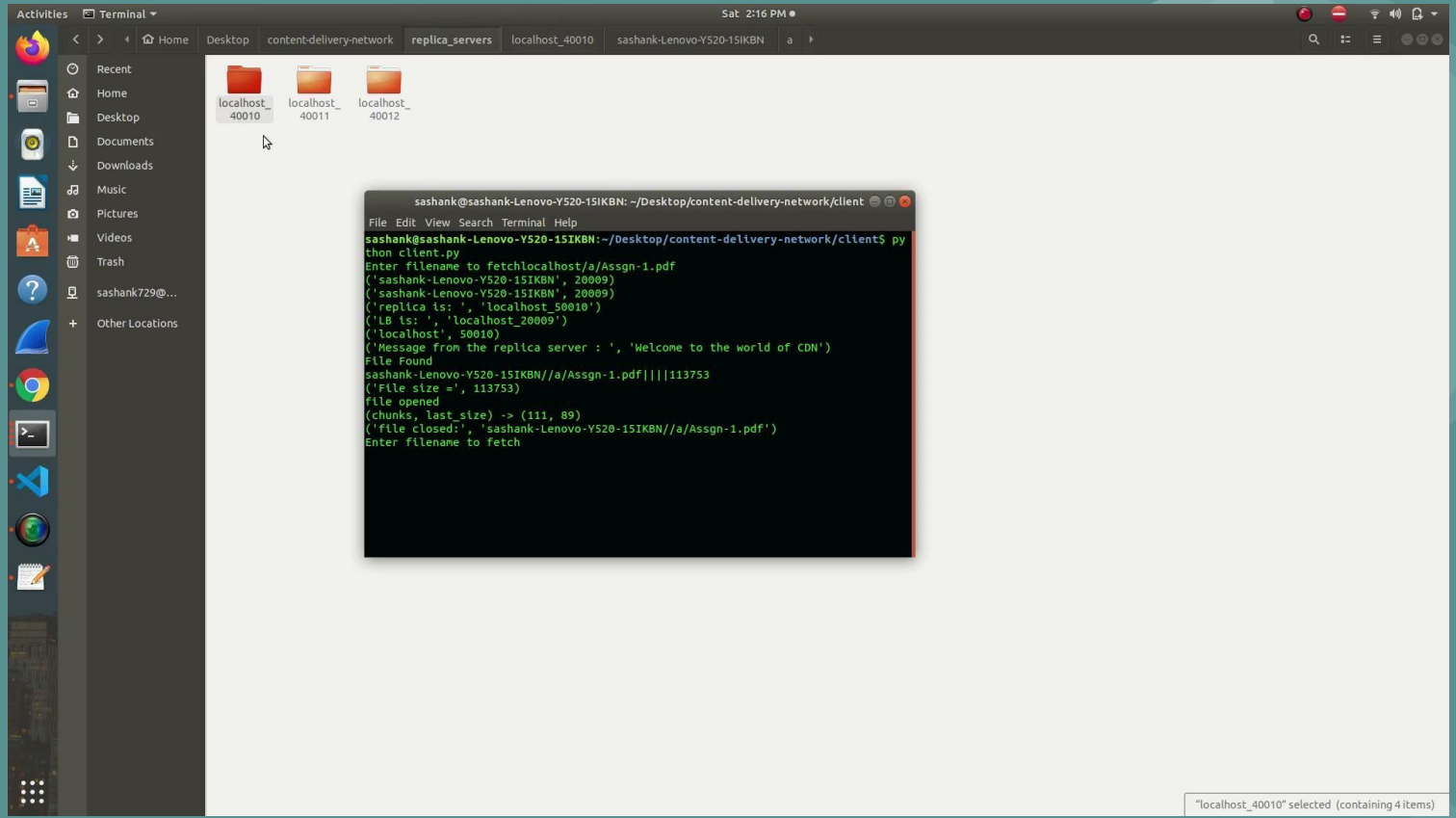
- It asks for snapshots of Gateway server at regular intervals and whenever it doesn’t get reply from Gateway server within the timeout, it becomes the new gateway server.
- It informs Origin that it has become the new Gateway server.
- It pings the Replicas and informs them that it is the new Gateway server.
- It continues as the main Gateway server.

Implementation details :-

Replica server :

- It responds it's health (current load status) to the gateway server whenever gateway server pings.
- It receives new files from the origin server if updates happen at origin.
- It serves the client whenever it gets request from the client for a file by sending a file.
- If it doesn't contain the required file, it asks the origin for new file, it delivers the file to client and replicates the file to all the other replica servers.
- If it recovers after crash, it wakes up and informs the gateway server that it is back and asks for data.
- Gateway server allocates the minimum load replica to the woke up replica to get data.
- After it gets data, it informs Gateway server that it is back and gateway server now adds this to replica list.

Demo


Activities
Terminal
Sat 2:16 PM
Home
Desktop
content-delivery-network
replica_servers
localhost_40010
sashank-Lenovo-Y520-15IKBN
a
Recent
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
sashank729@...
Other Locations
localhost_ 40010
localhost_ 40011
localhost_ 40012
sashank@sashank-Lenovo-Y520-15IKBN: ~/Desktop/content-delivery-network/client
File Edit View Search Terminal Help
sashank@sashank-Lenovo-Y520-15IKBN:~/Desktop/content-delivery-network/client$ python client.py
Enter filename to fetchlocalhost/a/Assgn-1.pdf
('sashank-Lenovo-Y520-15IKBN', 20009)
('sashank-Lenovo-Y520-15IKBN', 20009)
('replica is: ', 'localhost_50010')
('LB is: ', 'localhost_20009')
('localhost', 50010)
('Message from the replica server : ', 'Welcome to the world of CDN')
File Found
sashank-Lenovo-Y520-15IKBN//a/Assgn-1.pdf||||113753
('File size =', 113753)
file opened
(chunks, last_size) -> (111, 89)
('file closed:', 'sashank-Lenovo-Y520-15IKBN//a/Assgn-1.pdf')
Enter filename to fetch
"localhost_40010" selected (containing 4 items)