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+91 99405 72462



+9163819 07438



ijmrsetm@gmail.com



www.ijmrsetm.com

CDN (*Content Delivery Network*)

Om Sameer Ghewade

Student, Department of Computer Engineering, Marathwada Mitra Mandal's Polytechnic Thergaon, Pune, India

ABSTRACT : IT WILL REDUCE THE NETWORK CALL
ON MAIN DATABASE

- IT WILL REDUCE THE LATENCY TO ACCESS THE WEB SITE OR ANY CONTENT WHICH DATABASE IS NOT AVAILABLE IN YOUR LOCAL REGION AND YOU HAVE TO TAKE MORE NETWORK HOPS TO REACH TO DATABASE, WEBSITE OR CONTAIN. (NOW INSTEAD OF HITTING THE DATABASE USER WILL CONTACT THE CDN NETWORK TO REDUCE THE LATENCY)

ITEMS/KEYWORDS:

- Cache Storage
- Load Balancer
- Traffic Manager
- GUI
- Global cache storage

I. INTRODUCTION

A network of servers that distributes content from a server throughout the world by caching content close to where each end user is accessing the internet. Web-enabled device. when you access a website or stream a video, instead of the data traveling from one central server, a CDN stores copies of that data on servers located in different parts of the world. When you request the content, the CDN figures out which server is closest to you and sends the data from there. This makes websites load faster and videos stream smoother because the data doesn't have to travel as far.

Our CDN Network Will Use Some Component Which is Listed Below

- 1) Cache Storage
- 2) Load Balancer
- 3) Traffic Manager
- 4) Our Self Made GUI

II. APPLICATION ARCHITECTURE

The First layer will be the GUI layer in which you will have all selection base options, where you will update the cache of whatever website you want to be added to the CDN network. After updating or putting cache in the next section you will have an option where you have to set the max time

Or the age of the cache or by default the cache will expire in 7 days on GUI there will be one more option of creating an Alert where you can create the alert for expire date of the cache or the reminder for the updating of the cache you can select the different methods or ways for the reminder message of the cache currently we are having SMS, E-mail and Call services available

The next option on your GUI is to update the cache age or time before expires if you think the content on your website will not be changed for a long time and you don't want to update the cache or you don't want the cache to get auto expire you can select this option also give you the feature of update cache manually.

The GUI also gives the user the option to select where the CDN network is available and which local region you want to deploy your CND or which region your targeted Audience

The second layer will be of load Balancer A Geographical Load Balancer is like a traffic director for websites or apps, but with a twist. Instead of just spreading out the incoming traffic evenly among servers, it considers where the users are located

It will sort the users and cache according to their Geographical location. The users will be directed to the nearest CDN server to access the content. It can also be used to serve the dedicated content to the users based on the language and some other factors as per the requirement. We can also block the access of contain of users from specific Geographical locations this may happen that for a cost-effective solution, the company may set only one CDN for the region like Asia having only one CDN network. now every country in Asia is accessing the same CDN network based on the user requirement this type of special policy will be created but if during connection the latency of the main server or website is lower than the CDN then you will hit the main server.

For example, people from Japan want to visit a website that is in the Japanese language

The Users only understand the Japanese language

So the Load Balancer will take the people from Japan who want to connect to the website to the CDN which has the Japanese Language website cache server has a different language or if you want to block any users from any specific country you can do that with the help of this layer

There are more additional features about this layer. This layer also supports IP Base access if there is any confidential website like any secret service or any government website then the access for this website is limited so we can add a specific IP or the Network to this layer can give limited access to the specific network or IP

So the access will not be public of this CDN.

The third layer a traffic manager for websites or apps directs incoming requests to the right servers or resources based on certain rules or conditions. It might send some users to one server and others to a different server, depending on factors

The third layer will be the traffic manager which will direct the traffic based on the user policies. It is useful for managing the incoming traffic as per the user's need

The traffic manager gives you the ability or the feature to sort the traffic as per your needs. If you have more than 1 cache storage and you want to sort the traffic coming to the site on a random basis you will set the 50% to both the connection in the traffic manager. Now on a random basis, 50% of the traffic will be sent to the first connection and the remaining 50% of the traffic will be sent to the second connection

For example, If the user wants to try a new button

on this website but he doesn't want to show that button to everyone visiting the website he wants to collect feedback on the button from you. By checking whether the user is using this button or not. but he also wants the renaming people who will not be able to see this button will serve the old website so he will set the two different caches in the Storage. One will be the old website which does not contain the new button and another will be the new website which contains the new button

.After Setting the cache the user will set the traffic percentage he wants to direct to the new cache and old cache. Let's assume the user set 25% of users to the new cache and the remaining 75% to the old website cache. Now after some days based on the user's feedback, he can set all 100% to the new cache or discard the new cache.

This feature will help that website who like to try new features and layouts and have continuously updated versions to try.

The last layer will have the cache storage implement database caching mechanisms to cache frequently accessed database queries or results. This reduces database load and speeds up page rendering for dynamic content.

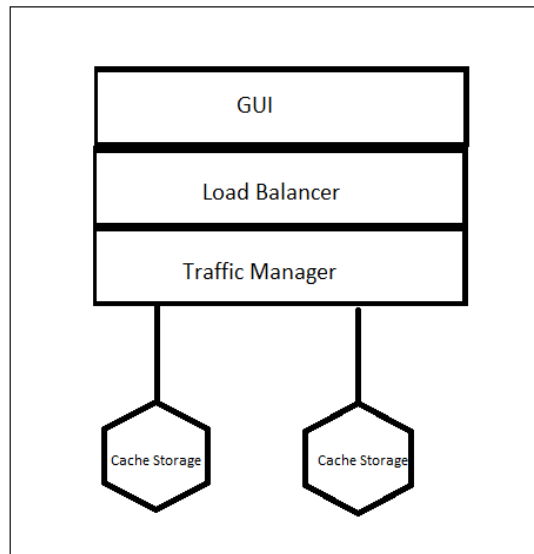


Figure 1.1

III. GAP ANALYSIS

Not all global companies can't afford to host their website all over the world. so by analyzing this weakness in the market we have developed the CDN network architecture

It will also help for **Faster Loading Times**: By storing copies of content on servers distributed across various locations, CDNs bring the content closer to users. This proximity reduces the physical distance data needs to travel, resulting in faster loading times for web pages, images, videos, and other content.

Improved User Experience: With reduced loading times, users experience smoother and more responsive interactions with websites and apps. This enhanced user experience can lead to increased engagement, higher retention rates, and improved customer satisfaction.

It also helps in **Scalability**: CDNs can handle large amounts of traffic and distribute it efficiently across their network of servers. This scalability ensures that websites and apps remain accessible and responsive even during traffic spikes or surges in demand, such as during marketing campaigns or viral content sharing

Global Reach: CDNs have a widespread network of servers located in various regions and countries around the world. This global reach enables content to be delivered quickly and reliably to users across different geographic locations, regardless of their proximity to the origin server.

ISSUES AND CHALLENGES

- . **Complexity of Setup**: Configuring and managing a CDN can be complex, especially for organizations with limited technical expertise. Setting up caching rules, configuring edge server locations, and integrating with existing systems require careful planning and execution.
- . **Cache Invalidation**: Ensuring that cached content remains up-to-date can be challenging. Content updates or changes on the origin server may not propagate instantly to edge servers, leading to stale content being served to users. Proper cache invalidation strategies are needed to address this issue.
- . **Geographical Coverage**: While CDNs have extensive global networks, there may still be regions with limited coverage or poor connectivity. Organizations operating in such regions may experience suboptimal performance or reliability compared to areas with better CDN coverage.



IV. CONCLUSION

- THIS NETWORK WILL REDUCE THE LATENCY AND HELP TO INCREASE USER SATISFACTION.
- IF THE STANDARD LATENCY OF ANY WEBSITE IS 240 MS THIS WILL REDUCE IT TO 14 TO 24 MS

The implementation of a Content Delivery Network (CDN) has proven to be a pivotal solution in optimizing the performance, reliability, and security of our web project. By strategically distributing content across a network of servers located worldwide, we have significantly reduced latency, enhanced user experience, and ensured uninterrupted accessibility for our audience regardless of their geographic location.

The CDN's ability to efficiently cache and deliver static and dynamic content has not only accelerated website loading times but has also minimized bandwidth usage and server load, leading to cost savings and improved scalability. Moreover, the robust security features provided by the CDN have fortified our web project against various online threats, safeguarding sensitive data and preserving user trust.

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