

# A survey on load balancing mechanisms in distributed systems

K. Ravisankar\*, Y. Jaswanth, G. Jagadeesh

Department of Information Technology and Engineering, VIT University, Vellore.

\*Corresponding author: E-Mail: koppuravuri.ravisankar2013@vit.ac.in

## ABSTRACT

Generally, for cloud computing and on normal server-side applications based on the map reducing programming paradigm, Distributed File Systems will be acting as key building block. In these Distributed File Systems, nodes simultaneously serve computing and storage Functions. A file is partitioned into a number of chunks and allocated in distinct nodes. So, map reduce can perform in parallel over the nodes. And in a cloud failure is the norms/files, and nodes/files may be upgraded, replaced and added in the system. Creation, deletion and updating of the files once in the system can also be done. However, doing these type of operations will result in load imbalance in a distributed file system (DFS). That is all these chunks of data which is stored in the form of files will be distributed as uniformly as possible among the nodes and files. All these distributed file systems which are of the Emerging level of production systems strongly depend on the central node for chunk reallocation / migration. And this sort of dependence is clearly lacking in a large-scale, failure-prone environment because much of the considerable workload which is linearly scaled with the system size is put under a central load balancer. This process of load balancing procedure thus may become the only performance reduction point and the single point of failure in DFS.

**KEY WORDS:** Big Data, Distributed File System, Migration, Load balancing, Servers, Mechanism.

## 1. INTRODUCTION

Nowadays we are seeing many companies are using old technology i.e., by using servlets in java, java server pages, and asp.net. these technologies are easy to implement but these applications will reduce the performance of the server due to high load for example if we see the working of servlet architecture it is a long process initially the client will request the server a data in the middle of the process it will reach a segment where data and metadata are maintained next the request reaches to the server then server sends the data as per the client request. In the same way if we use the app to build an application.

It is a big process when compared to the java servlets and java server pages because when an application is said to be executed it has to load the server and then it throws the output till then people has to wait to see the output which was visualized by the server .if we think about the security it has high security no client can able to edit the code because it is not accessible by the client but now the problem is not about security it is about the load balance so it is time taking procedure to execute the applications which are built based on applets ,servlets, and asp pages so it is must advance the people by adopting the new technologies. Again we need to configure the server settings i.e., by maintaining the server like glassfish, apache tomcat ,is and many servers are available in the market only we can run applications based on java or asp.net so here comes the solution of the above problems for example of current trend node.js is getting popular the only reason node.js getting popularity is due it its accuracy , robustness and speed more ever it is light weight platform need not configure the server settings while using node.js .

## 2. EXISTING SYSTEM

**Active Server pages:** In addition to the text and HTML based scripts, web pages also contain the server side scripts. When we send a request to the asp file, IIS will pass the given request to the asp engine.it can read line by line, where internet information services will execute scripts and the result will be sent to the browser as a plain HTML text. These are denoted by the delimiters. Those are <%...%>.

Active Server Pages have access to any data or the database. There will be dynamic pages and the pages are denoted as asp.

Two asp.net pages will communicate in the web clients through is. IIS will authenticate the request. If we allow anonymously is turned on, no authentication is needed for the request that has been sent. It will find the resource that is requested and also it will send the appropriate sources to the client if they are authenticated. There are two types of applications will be there.

- Web forms and
- XML web forms.

It supports only the scripting languages and also interpreted. A single page will represent both the HTML and script. Security levels are not an option when compared to the asp.net. Asp applications are browser dependent.

**Working Procedure of a servlet:** Servlets are programs that run on web or server. It acts as an intermediate or middle layer between a request from the browser and Http application or the end database server. With the help of servlets, we can collect input or request from the user through web forms, dynamically search the data records or another resource it retrieves the request information.

Using Common Gateway Interface (CGI) servlets often serve or work as a program. Servlets are platform-independent because servlets are run by means of java Servlets executes the user request within the address space of the server. It can communicate with the databases, other applets, and other network software by means of RMI and Socket mechanism.

Read the explicit data sent by client request. This includes the web pages or applet. Results are generated by means of the process the data. The process may be database interactions, executing an RMI or invoking a web service or compute the responses directly based on the request. The response the explicit data to the client by means of a document. This document can be sent based on request that will be in a variety of formats, which includes text(RMI or XML) or binary form etc.,

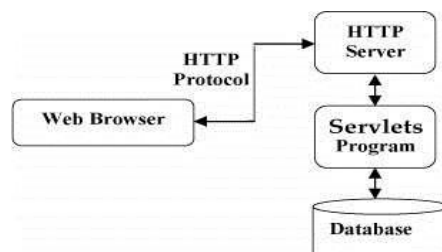


Figure.1. Working procedure of Servlet

### Proposed Solution:

#### Programming Techniques:

**Node. JS:** Basically node. js is an event driven web server written based on JavaScript (particularly v8 engine).

**Working procedure:** So, as we know that there has always been a big problem with computers is where the CPU can only do one single thing at a time. Means only one work or task can be done at a time.it was solved much time ago by the introduction of multithreading, which allows us to have multiple (many) threads on a single CPU.

Normally in every platform, we will use a synchronous type of operations, but node.js will use asynchronous threads means one thread will be doing many operations before the completion of the first operation. So there is no need of making the incoming requests waiting for the server's CPU to reallocating a new thread.

This will make the process very fast but not advisable to use these asynchronous methods in every working scenario.it is preferable to use these only if you want a specific piece or portion of your web architecture to be live and/or super-duper fast.

#### Data storing and reduction techniques:

**Big Data:** nowadays we can see a huge increase in the amount of data that has been created because of more users and increase in the ways of using a technology , so because of this much amount of data has been created which in return is creating a problem of reducing it or finding out the wanted part , so these are the type of problems which we are facing these days by usage of traditional systems ,so a better storage technique needs to be evolved and the reduction techniques also should be well optimized in that. So big data has been introduced in which data which will be received by the servers will be stored in the many distributed systems by forming clusters (separately) so that it will be easy while selecting the wanted data. The main advantage with the big data here is the huge increase in the performance, because we will be using the map-reduce to reduce the data, so it is very easy to do operations on servers with high accuracy and speed.

**Amazon Elastic Map Reduce:** Elastic Map Reduce by Amazon is a Web Service (Amazon EMR) that makes the process huge amount of data very quickly and also at a very effective rate for cost. This particular EMR uses Hadoop which is an open source framework to distribute the data and processing of data across a resizable cluster of Amazon's own EC2 instances. Amazon elastic map reduce is being used by different type of applications, which includes web designing and log analysis and also data warehousing, machine learning and many types of financial analysis, bio information and scientific simulation. Millions of amazon elastic map reduce clusters every year will be launched by the customer.

**Algorithm for web based technologies:** It is better to use peer to peer system than a single server because we can improve the resource utilization by making use of unsaved resources throughout the network. distributed hash tables will contain in this type of systems as an allocation mechanism this DHT performs whole operations like join, leave and update .here it uses the virtual server for temporary storage of data we can maintain the proportionalities of the server capacities by balancing peers in the heterogeneous platforms in this peer to peer decentralized load balanced algorithm it constructs a network to manipulate global information and it is organized in the tree shape fashion in this algorithm each peer can independently compute their own probabilities of distributed capacities of participating peers and reallocate their load in parallel .

**Optimizing techniques in client and server side:** Do not use images instead use CSS?

If we use images we are unable to maintain the attractiveness and also the size of image is high compared to the code which we include and also it takes high time to load the image due the execution of process

**Optimizing the images:** We know that the extension of the images used generally jpeg as .jpg gif files as .gif and bitmap files as .bmp these images are optimized to use for the internet purpose it is better to maintain the image size maximum of 10kb .

**Compress CSS by Shorthand properties:** We know that CSS files are pretty big, by consisting of lots of useless spaces and brakes. These shorthand properties are great! This is a great way to reduce the lines of code containing in these documents, it allows for faster download times and also easy for editing.

**Delete unnecessary HTML code, tags, and blank spaces:** It helps in compressing the files because by reducing the unnecessary code tags and the Meta tags default values in HTML elements, etc.

**Prefer using AJAX libraries:** These libraries are used to communicate with the server using JavaScript without reloading the page it consist of much content that is common between them. By using traditional methods, the content would have to be reloaded for each and every request.

**Remove Hot Links:** The hot links will use high bandwidth so this is the better tip not to maintain the hot links in the applications to increase the bandwidth

**Compress the files:** It is very useful to compress the files which we have created because it saves the space in our disk so that we can save the important data. When the request was received by the server it can understand the data which is in the compressed mode it is a great thing on the server is activated if the requested file is in compressed mode

**Don't go for commercial way to share your images/files (or) even in web hosting:** If your teammates are at different places you need to share the data which you are created or using it is better to use free services provided by some companies even some of the cloud companies are offering their services for beginners to use.

Don't use Attachments.

It is better not to provide the files directly in the host on the server if you want to use it somewhere on the net, better to use links so that we can say the bandwidth will be attractive when compared to the attaching file directly it will increase the server load.

**Caching of Website:** It is very useful in retrieving the data from a ready storage without generating it every time the same information is needed to enable caching on your website if it is not dynamic it allows the end users to read from your server once in a while, there is a need to read from its own website but need to set the expiry date and it is better to keep the images cached locally.

### 3. RESULTS

By using an Asynchronous powerful thread, processing of web-based requests has become extremely fast and there was approximately 50 percent increase in the response times and the probability of getting the required work done in scheduled time has also been increased. Now the only problem is with data retrievals when performing data rich operations like loading images, loading gif's, loading videos. But with inclusion of big data techniques in servers like hadoop (highly cost-inefficient), we found a way to process data fast and reliable too, resulting in huge increase of reliability.

### 4. CONCLUSION

So we can conclude that by the usage of new technologies which will provide better optimized performance and by the usage of new storage techniques and reduction mechanisms we can better optimize the performance of our websites and make sure that our web applications or web servers will work in a very optimized manner with a high accuracy, reliability, and security.

It is very advisable in the current day scenario to use these optimization techniques because on every server these days due to increasing in the number of internet users and increase in a number of technology adopters there is a huge increase in the number of users.so something has to be done to overcome this problem of heavy load on the servers. So the better solution to the technology which has been developed is to use high powerful and well-optimized server working procedures and using the better optimized and organized storing mechanisms.

By the usage of above techniques which are described above we can better maintain the servers and applications in a well-working condition such that they will experience a less load.

### REFERENCES

Aditya Patel B, Manashvi Birla, Addressing Big Data Problem Using Hadoop and Map Reduce, Fadnavis R.A, (IJCSIT) International Journal of Computer Science and Information Technologies, 6 (1), 2015, 443-445, 2012.

Ankush Deshmukh P, Applying Load Balancing, A Dynamic Approach, 2 (6), 2012.

Anuradha Sharma, Seema Verma, Load Balancing Algorithm In Grid Computing Environment, Proceedings of BITCON-2015 Innovations For National Development, 2015.

Garcia Ted, and Taehyung Wang, Analysis of Big Data technologies and method-Query large Web public RDF datasets on Amazon cloud using Hadoop and Open Source Parsers, In Semantic Computing (ICSC), 2013 IEEE Seventh International Conference on, 2013, 244-251.

Herb Sutter, a Fundamental Turn toward Concurrency in Software, Dr. Dobbs's Journal, 30 (3), 2005.

Jean Ghanem, Implementation of Load Balancing Policies in Distributed Systems, B.E., American University of Beirut, 2002.

Karen Devine D, New Challenges in Dynamic Load Balancing, Discrete Algorithms and Mathematics Department, Sandia National Laboratories, 2012.

Matt Welsh, An Architecture for Well-Conditioned, Scalable Internet Services, SEDA, 2001.

Paul Werstein, Load balancing in Cluster Computer, IEEE, 2006.

Stefan Tilkov, Steve Vinoski, Node.js, Using JavaScript to Build High-Performance Network Programs, IEEE Internet Computing, 14 (6), 2010.