rediffmail enterprise

Rediffmail Enterprise

High Availability Architecture

Introduction

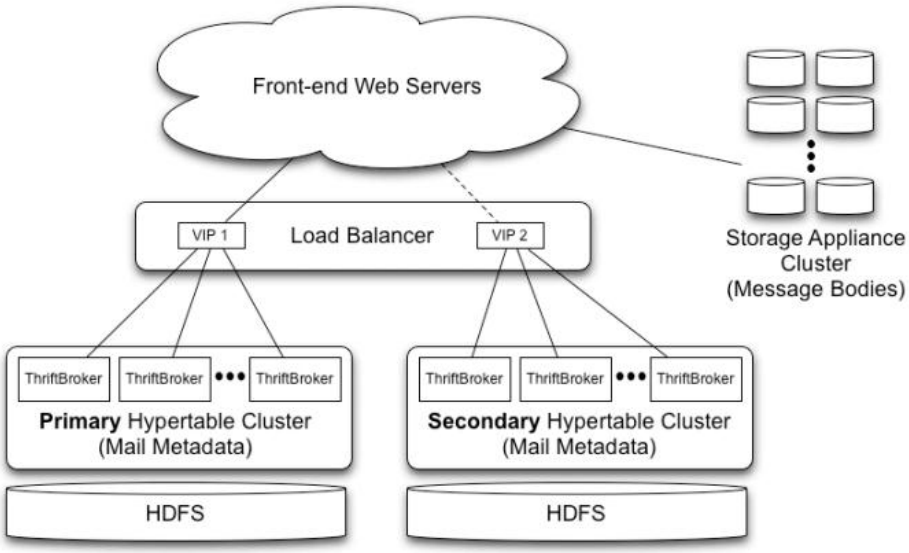
Rediffmail Enterprise has proven track record of 99.9%+ service availability. Multifold increase in number of users and introduction of advanced features has not affected our service quality and availability. We attribute our reliability and scalability to well-designed HA (high availability) architecture.

Rediffmail Enterprise's HA architecture is based on three important concepts of service availability. No single point of failure, fault tolerant architecture and continuous monitoring of services makes sure that service is available all the time.

No single point of failure

Infrastructure is composed of hardware and software components. All the hardwares are prone to failure in its lifetime. We ensure that we include best available hardware component in our infrastructure. Typically service fails due to bottlenecks in the system which does not have any redundant component to switch to in case of failure.

We have analyzed the each component of infrastructure and added redundancy to granular level possible.



Meta data and mail files redundant architecture

1. Server cluster redundancy

Server clusters are responsible for processing the entire mail data. With millions of mails getting processed every day, we have array of server clusters that complement each other. We have multiple redundancies for server cluster and we make sure that server utilization never exceeds a threshold limit.

2. Storage redundancy

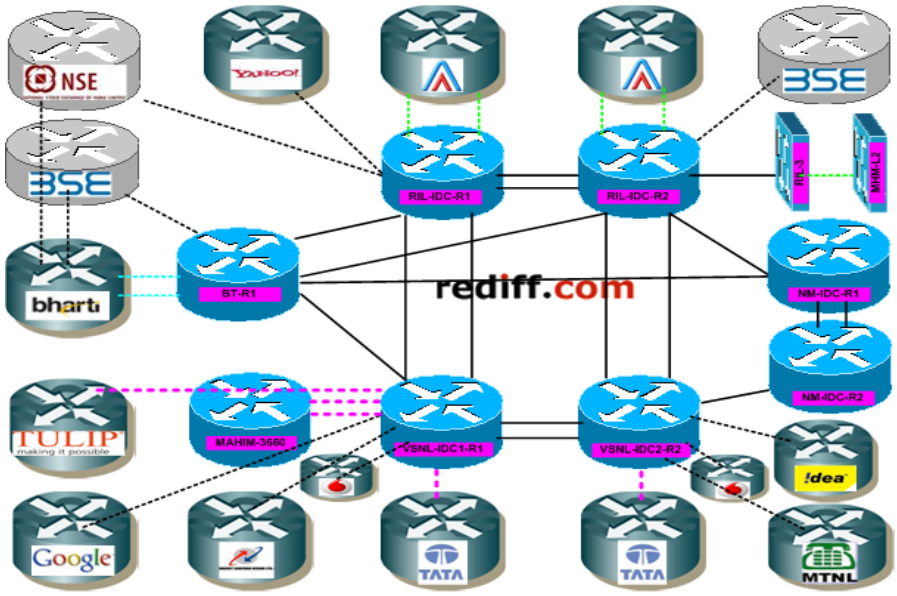
The storage is divided into two components; metadata and mail file. Such division allows the faster data access and quick response to queries. For the data storage, Rediffmail enterprise has deployed RAID6 (redundant array of independent disks) standard. This standard mandates each data file to be copied at least 2 times on redundant disks. Also these redundant disks should always be operational and accessible all the time.

3. Load balancer redundancy

Load balancer is responsible for optimal distribution of data processing requests to server clusters. Even for the load balancers we have added the redundancy in the system. The load balancers are always in active-passive mode. If active load balancer not available, load balancer in passive mode takes over and ensures smooth processing of data. Each load balancer has two VIPs (virtual IPs) internally to support redundant storage architecture as indicated in schematic above.

4. Network redundancy

LAN and WAN network carry all the data from one data center to another and to end user. They are the backbone of entire infrastructure. We have created mesh of interconnectivity between major ISPs in India as well as our data center. Thus even if one link is down, the data can flow through multiple other routes.

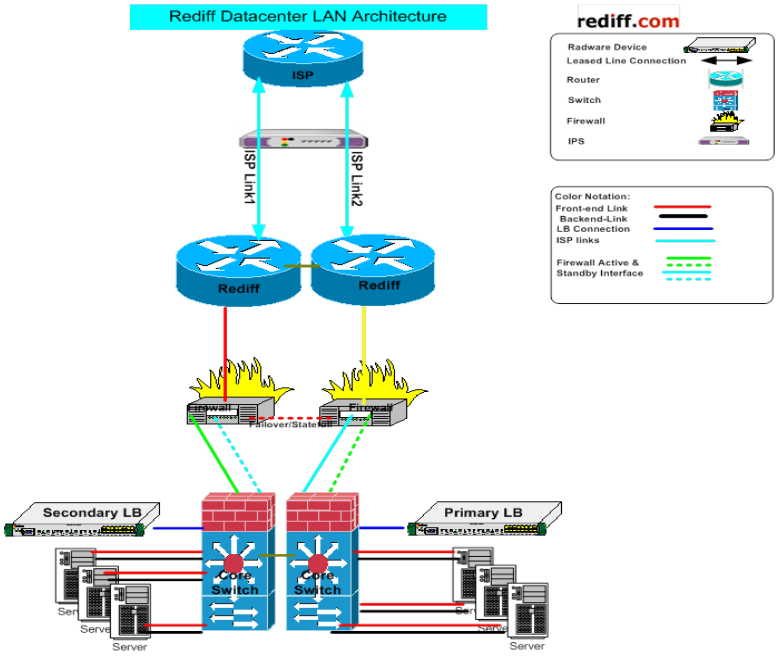


Rediff's interconnected network with Major ISPs

5. Network components redundancy

Sometimes even a small network component such as router or firewall can cause disruption in service. If one these hardwares fail to perform, data can be processed or transferred. We have setup a parallel infrastructure with replication of each network component as indicated in the

diagram. In case of hardware failure, switchover happens automatically within human intervention.



Rediff datacenter LAN architecture

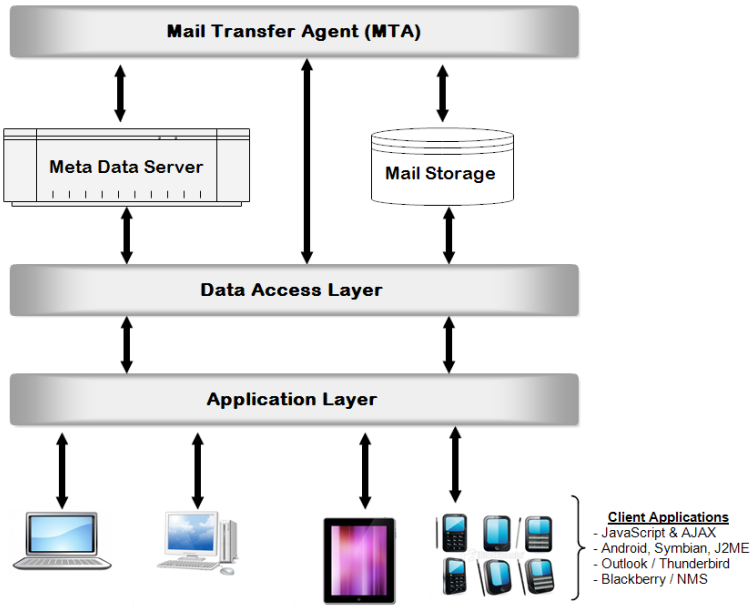
Fault tolerance

Fault tolerance is generally measured in terms of ability to recover from errors that occur due to unprecedented event or surge of load on the system through redundant environment. Fault tolerance also includes confinement of problem to origin before it affects rest of the system.

The fault tolerant architecture is designed to address any transient, intermittent and permanent faults.

1. Distributed mail architecture

The mail architecture has been designed to abstract different components of system from one another. Even if there is any problem with one of the components of system, other components are not affected. This architecture also helps to switch to redundant component in place of faulty one.



Distributed mail architecture

2. Self-stabilization

We have built intelligence in system to automatically identify the hard and soft failures and switch to redundant component without any human intervention. This makes sure that even in case of component failure; system auto recovers and stabilizes itself.

3. Quality control

With high quality control mechanisms, we ensure a safe design for continuous uptime. These high quality control mechanisms involve periodic testing and maintenance of all components such as hardware and software. Such mechanisms are crucial for reducing the failure risk and impact availability. We also conduct regular audits of entire system to identify likelihood of any failure.

Continuous Monitoring

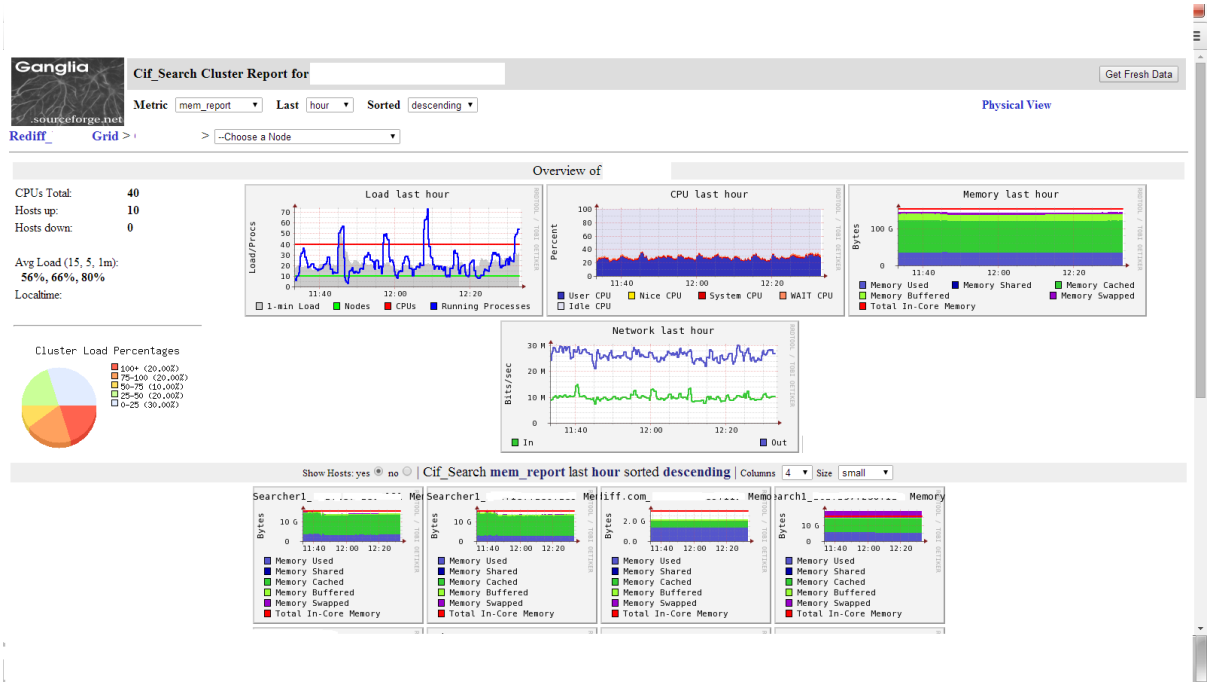
Along with multifold redundancy and fault tolerant architecture, 24x7 monitoring of system is crucial in ensuring the high availability of service. We have deployed multiple monitoring systems to analyze and predict the health of the system. Monitoring systems are automated with manual overdrive

1. Automated early warning system

Early warning system continuously monitors and analyses the system health on various parameters including application latency, concurrency, server utilization, malfunctioning of any component, utilization of storage and many more. If any of the parameter crosses the threshold mark, an automated warning is sent over email as well as mobile to concerned teams. This

system also forecast capacity requirement in near future based on historical trends and notifies the team.

2. 24x7 service monitoring



Screen capture of one of monitoring tools

A dedicated service monitoring team is available at data centers 24x7. They monitor the health of the system using tools as well as they physically inspect the server locations. If required they can replace the malfunctioning component immediately.

Data recovery

We provide three levels of data recovery services. One can choose whichever suits them best

Backup and Restore

Rediff's email backup solution, the mails are backed up as soon as they are sent or received by the user. All the sent or received mails of user can be backed up even if user is accessing mails from multiple devices. The mailbox restoration is as simple as a one click of the button. Administrators can even restore the accidently deleted mails.

Email archival

Rediff archival solution does not need any manual intervention to archive the data. Mails are archived as soon as they are sent or received by any user of the domain. The archival solution is device as well as network agnostic.

All the mails are indexed and then stored in separate the system. Required mail cab be searched using combination of parameters such as 'from address', 'to address', words in 'subject' line, 'attachment name' as well as the mails from specific date range. The system will display the list of emails matching the query within couple of seconds.

Rediff archival solution allows the download of archived data. If the data is to be produced for legal or audit purpose, administrator has an option to download the searched mails as a compressed file

Disaster recovery

In case of any natural disaster such as fire or flood, it is very important that the data is not wiped off. We have taken certain measures to ensure that data is available even if a part of infrastructure is affected due to natural disaster. In this solution we replicate the entire data at different data center in real time. This data can be restored back when the systems are up again.