**Description of Cloud Server**

## Comparison Table for Cloud Vs Physical Server

|  |  |  |
| --- | --- | --- |
| Feature | Cloud Based Server | Physical Server at Data Centre |
| Server and IT Infrastructure Space | Not Required | Required |
| Firewall and Security Devices | Not Required | Required |
| Requirement of IT Professional | Not Required | Required |
|  |  |  |
| UPS, network switches and Firewall | Not required | Required |
| Backup in Different Data centre | Available in package | Need to have different server at different location |
| Scalability for Future upgrades | Easily upgrade package with small incremental cost | Need to buy new hardware to include more RAM / hard Disk |
| Disaster recovery in Different Seismic Zone | Available in Package | Need to have different server at different location |

## Specifications for Cloud Server

|  |  |  |
| --- | --- | --- |
| S. No | Item | Value |
|  | Cloud Type | VPS (Virtual Private Server) |
|  | Operating System | Windows Server 2012 Standard |
|  | Number of Static IPs | 2 |
|  | Hard Disk | 100 GB |
|  | Processor Cores | 2 |
|  | RAM | 4 GB |
|  | Bandwidth (Data Transfer Limit) | 100 GB per month |
|  | Mirror Server | Required |
|  | Backup Server | Required, by Vendor |
|  | Disaster Recovery Provision | Required, By vendor |
|  | Virtualization | Kernel Based (KVM) |
|  | Firewall | Required |
|  | Dashboard for performance monitoring | Required |
|  | Number of Domain | Unlimited |
|  | Control Panel | Required, for managing sub-domains and user accounts |
|  | Database Server | MS SQL Web Edition 2014 |
|  | Antivirus | Symantic Antivirus |
|  | Root Access | Required |
|  | Service and Support | Required for Database and OS |

The cost of cloud service for the above mentioned specifications should be around Rs 10,000 per month. The specifications for cloud server includes these major Elements, as described below:

**Operating System:** The choice of operating system depends on type of applications hosted. The available options are 1) Windows Server 2012 and Red Hat Linux. Linux based systems are more secure and flexible but require more programming and management. On the other hand, Windows based systems are more user friendly with our agencies engineers having more exposure to using Windows based systems. For the Purpose of Hydro-meteorological data under NHP, Windows based systems are recommended. However, Agencies are free to choose the operating system based on their existing system, existing applications and preference.

Cost wise, Linux based systems are bit cheaper than Windows based system, with difference being around Rs 2,000 per month.

**Static IP:** Static IP is required to access the services on Cloud. The IP used for uploading the data to server may be same or different from IP used for hosting website for public access. For security reasons, it is suggested to have at-least two static IPs, one for uploading and exclusive use by the implementing agency whereas second IP for accessing website by public.

Normally at least one Static IP comes along with any Cloud server package. The cost of additional IP is around Rs 300 per month.

**Hard Disk Space:** This is one of most important factor in deciding the cloud server. Normally vendors offer hard disk in increments of 50 GB. For the purpose of hosting Hydromet data and associated website, a disk space of 50 GB is more than enough for around ten years of data. Apart from Disk space, another factor to consider for Disk space is weather the hard disk is Solid State Disk (SSD) or traditional magnetic disk. SSD are often fast, reliable and more expensive.

Normally Vendors provide 50 GB as basic package, the cost of every additional 50 GB hard disk is around Rs 250 per Month.

**RAM:** Random Access Memory or RAM on server is decided based on size of applications hosted on the cloud server. The typical requirement for hosting hydromet data on database and website is 1 GB. The RAM may be scaled upward if the website contains GIS based applications.

Typical RAM offered by vendors on entry level packages is 1 GB. Additional RAM is available at approximately Rs 500 per month per GB.

**Internet Data Transfer Limit:** The internet data transfer limit (or bandwidth) is volume of data transfer (uploaded or downloaded) from cloud server via internet. The upload volumes are normally low, with agencies uploading daily real time data. The download volume of data depends on number of users accessing the data, website, size of download files, number and size of applications hosted etc. For example a website showing time series rainfall data would require much lower download by users as compared with a website working on GIS, spatial or remote sensing data, where data download volumes would be considerably high.

The typical entry level cloud packages come with some minimum bandwidth of 200 GB per month. Additional bandwidth may be added to package at approximate cost of Rs 1000 per TB (1000 GB). Some vendors offer cloud server packages with unlimited bandwidth.

**Availability, Backup and Disaster Recovery:** These three factors are inter-connected with each other. Availability is decided in percentage of time when server is online and functional. A typical availability of 99% or higher is desired in the application of Hydromet data. 99% availability would mean that the server may be down for maximum of 7-8 hours in a month. An availability of 99.9 % would make server offline for maximum of 45 minutes in a month.

In cloud server, vendors provide Four Copy System, keeping your data in four different servers.

* **First Copy:** This is main copy of data and software where the website and database is hosted.
* **Second Copy:** 2nd Copy Cloud is exact mirror of first copy and have live synchronous / replication, which ensures the high uptime. Whenever the first copy server is down or offline, the system automatically shift to second copy without affecting the website, therefore ensuring high system up time.
* **Third Copy:** 3rd Copy Cloud is a **backup** kept to ensure data is safe from real time integrity issues. Normally third copy is kept in a different data center. The backup is either setup automatically at fixed interval or can be triggered manually by user. Normally vendors provide a system where whole backup can be taken at fixed interval on the third copy server. In case first and second copy gets corrupted, the third copy can be used to restore backup.
* **Fourth Copy:**  4th Copy Cloud is used in case of **disaster recovery**, and the server is placed in a different seismic zone which is at least 500KM away from primary data center. This will ensure disaster recovery as part of cloud security in case of any major outages in the Primary Data Center.

The number of cloud copies offered depends on vendor and selection of cloud package. It is suggested to have 4 copy cloud system to ensure foolproof system for hydromet applications.