* **Write note on a Fabric Controller in windows azure? Explain its role in datacenter (6 Marks)**

**Ans :**

One of the key features of the Windows Azure is to provide highly scalable solutions to support large volumes of simultaneous users accessing many different applications hosted on the platform. This capability is handled by providing a scale-out feature within the platform to manage a sudden increase in the volume of users accessing the system.

The fabric controller manages and controls the Windows Azure Fabric and is responsible for automating the load balancing to ensure the required scalability is achieved. Windows Azure Fabric has parallel virtual machines running the image of the applications utilizing a Hyper-V, which is a fine-tuned version specific to Windows Azure.

The following figure displays the Windows Azure Fabric.

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Fabric controller utilizes the visibility of the configuration file indicating deployment requirements, such as, storage issues, number of Web and Worker Role instances and so on. The fabric controller is notified if a machine fails and configures a new virtual machine with the same configuration and adds it to the Windows Azure Fabric to serve the needs immediately. This ensures service availability without seriously impacting the end-user.

Multiple deployment topology configurations can be customized using the inter-role communication feature of Windows Azure which has the capability to communicate between individual role instances in the user application. This supports complex topology configuration within Windows Azure as it is better supports message infrastructure and mapping.

So far we have covered the core services of Windows Azure platform dealing mainly with structured and relational data. Windows Azure provides the same through SQL Azure – which will be highlighted subsequently.

Several instances of Fabric Controller run across various racks. We are not going into the detail of how many instances run in a specific number of racks. The Fabric Controller manages Windows Azure resources such as applications, VM instances and every bit of hardware across different domains.   
  
For example, if an application requires four web role instances and one of them stops functioning, the Fabric controller will start a new web role instance. The fabric controller will do the same thing, that is start a new instance of the role even if a computer stops functioning. The load balancer will automatically be reset to point to these newly created VMs.   
  
Azure ensures that a minimum of two instances are always running. This is done so that, if one instance fails, the other instance is always available to keep the application running. For this reason, SLA (Service License Agreement) enforces you to specify that a minimum of two instances are running for a web role of an application.   
  
Azure ensures that no application stops running by creating instances and locating these instances in different fault domains. As a developer we do not have direct control over how many fault domains applications use. A fault domain can be thought of a rack. The fabric controller is assigned the task of creating the required number of VMs and locating them appropriately.   
  
For example, suppose a developer requests five Web role instances and four Worker role instances for his application. And suppose all of these instances are placed on VMs on the same rack serviced by the same network switch. If either the rack or the switch failed, the entire application would no longer be available.   
  
As Azure assures high availability, this situation is not allowed. The Fabric controller groups the Virtual Machines it is responsible for into a number of domains. As shown in the figure, the application has two Web role instances, and the data center contains two fault domains. When the fabric controller deploys this application, it places one Web role instance in each of the fault domains.   
  
So, if any hardware failure occurs, the entire application does not come to a halt.