**Cloud software: IBM Smart Cloud Services**

* IBM cloud computing is a set of cloud computing services for business offered by the information technology company IBM.
* All offerings used to be marketed under the name IBM Smart Cloud.
* IBM cloud includes infrastructure as a service (IaaS), software as a service (SaaS) and platform as a service (PaaS) offered through public,
* Private and hybrid cloud delivery models, in addition to the components that make up those clouds.

**IBM cloud computing model:**

IBM offers three hardware platforms for cloud computing. These platforms offer built-in support for virtualization. For virtualization IBM offers IBM Websphere application infrastructure solutions that support programming models and open standards for virtualization.

The management layer of the IBM cloud framework includes IBM Tivoli middleware. Management tools provide capabilities to regulate images with automated provisioning and de-provisioning, monitor operations and meter usage while tracking costs and allocating billing.

The last layer of the framework provides integrated workload tools.Workloads for cloud computing are services or instances of code that can be executed to meet specific business needs.IBM offers tools for cloud based collaboration, development and test, application development, analytics, business-to-business integration, and security.

**IBM SmartCloud (or IBM Cloud):**

The IBM SmartCloud brand includes infrastructure as a service, software as a service and platform as a service offered through public, private and hybrid cloud delivery models. IBM places these offerings under three umbrellas:

* SmartCloud Foundation,
* SmartCloud Services and
* SmartCloud Solutions.

SmartCloud Foundation consists

* Infrastructure,
* Hardware,
* Provisioning,
* Management,
* Integration and
* Built using those foundational components, PaaS, IaaS and backup services make up SmartCloud Services.
* Running on this cloud platform and infrastructure, SmartCloud Solutions consist of a number of collaboration, analytics and marketing SaaS applications.
* IBM also builds cloud environments for clients that are not necessarily on the SmartCloud Platform.
* For example, features of the SmartCloud platform such as Tivoli management software or IBM Systems Director virtualization can be integrated separately as part of a non-IBM cloud platform.
* The SmartCloud platform consists solely of IBM hardware, software, services and practices.
* IBM SmartCloud Enterprise and SmartCloud Enterprise+ compete with products like those of Rackspace and Amazon Web Services.
* In 2011, IBM SmartCloud integrated Hadoop-based InfoSphere BigInsights for big data.
* Green Hat for software testing and Nirvanix for cloud storage.
* Users may build their own private cloud or purchase services hosted on the IBM cloud.
* Users may also purchase IBM hardware, software and services to build their customized cloud environment.
* By 2014, the name SmartCloud has been replaced with products that have a prefix of "IBM Cloud". A product called IBM Cloud Manager with OpenStack would be IBM's integration of OpenStack along with a multitude of value additions that would serve enterprise customers. A product called IBM Cloud Orchestrator .The aforementioned SmartCloud products have been discontinued.

**Public, private and hybrid cloud models:**

* IBM offers cloud delivery options including solely private cloud, solely public cloud, and variations in between.
* Private, public and hybrid clouds are not strictly distinct, as IBM allows the option to build a customized cloud solution out of a combination of public cloud and private cloud elements.
* Companies that prefer to keep all data and processes behind their own firewall can use private cloud services managed by their own IT staff.
* A company may also choose pay-as-you-go pricing. Hybrid cloud options allow for some processes to be hosted and managed by IBM, while others are kept on a private cloud or on a VPN or VLAN.
* IBM also offers planning and consultation throughout the deployment process. IBM offers five cloud provision models:

**Cloud standards:**

* IBM participates in several cloud standards initiatives within various standards development organizations involved in cloud service models IaaS, PaaS and SaaS, all of which work toward improvements in cloud interoperability and security.
* IBM is a member of The Open Group, a council that works for the development of open, vendor-neutral IT standards and certifications. Other members of the group include HP, Oracle, SAP and numerous others.
* IBM contributed the Cloud Computing Reference Architecture in February 2011 to The Open Group as the basis of an industry-wide cloud architecture. IBM’s CCRA is based on real-world input from many cloud implementations across IBM.
* Within the IaaS space, IBM is a member of the Cloud Management Work Group within the Distributed Management Task Force (DMTF), which released a draft version of their IaaS APIs, called the Cloud Infrastructure Management Interface (CIMI).
* The CIMI APIs define a logical model for the management of resources within the Infrastructure as a Service domain. With these APIs, clients can create, manage and connect machines, volumes and networks.
* For PaaS and SaaS standards, IBM, Red Hat, Cisco, Citrix, EMC and others contribute to the Topology and Orchestration Specification for Cloud Applications (TOSCA) technical committee within Organization for the Advancement of Structured Information Standards (OASIS), which aims to provide a standardized way of managing the lifecycle of cloud services, for portability of cloud based applications.
* TOSCA's goal is to advance an interoperability standard that will make it easier to deploy cloud applications without vendor lock-in, while maintaining application requirements for security, governance, and compliance.
* IBM participates in a number of cloud security related standards including the DMTF Cloud Auditing Data Federation (CADF) working group, and the OASIS Identity in the Cloud (IDCloud) technical committee.
* CADF is designed to address the need for a cloud provider to provide specific audit event, log and report information on a per-tenant and application basis.
* IDCloud aims to addresses the serious security challenges posed by identity management in cloud computing and investigates the need for profiles to achieve interoperability within current standards.