

Exam Analysis System using ServiceNow based on Cloud Computing

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Abstract - Cloud computing is a way of computing that is more helpful to people in today's century. Cloud computing helps you to save a huge amount of hardware costs required. Cloud computing delivers computing services using the Internet. The services provided by cloud computing are online databases, servers, software, etc.

Cloud computing does not require licensing for most of its services but that does not mean cloud services are free of cost. Cloud computing usually uses a pay-as-per-use model that the customer only pays for the services they use and the amount of service they use.

Cloud computing can also be referred to as virtual computing because you access things over the internet which are not physically present on your computing device.

ServiceNow is a Platform-as-a-Service provider based on cloud computing which is mainly used as a ticketing tool but its capability is more than just a ticketing tool.

Keywords: Cloud Computing, Service Portal, IaaS, PaaS, SaaS, ServiceNow.

1. INTRODUCTION

Cloud Computing is a general term for anything that involves delivering hosted services over the Internet. Instead of undeviating system architecture, Cloud Computing supports the ability to dynamically scale up and quickly scale down, offering cloud computing end-users or customers high reliability, quick response times, and the flexibility to handle traffic fluctuations and demand for data on the network.

Rather than just owning their own infrastructure or data centers, organizations can rent access to anything from applications to storage from a cloud service provider.

One benefit of using cloud computing services is that organizations can avoid the cost and complexity of possessing, hosting and maintaining their own IT infrastructure. Instead the organizations simply pay for what they use when they use it.

In turn, providers of cloud computing services can benefit from significant economies of scale by delivering the same services to a wide range of customers. So the user can store their data, not in their local system, and can access it from anywhere globally.

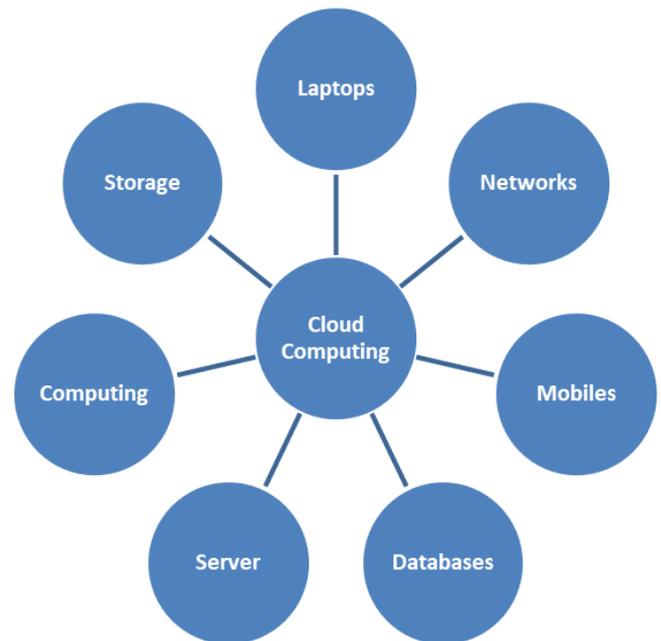


Fig -1: Basic elements of cloud

1.1 Deployment model in cloud computing

Cloud services are deployed in the following ways :

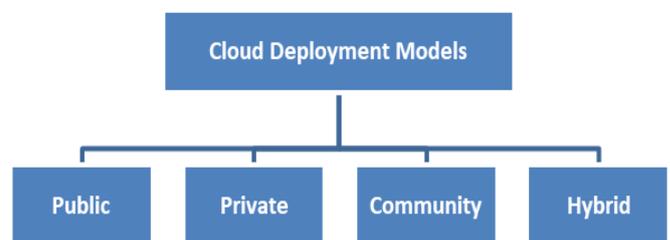


Fig -1: Cloud Deployment Models

1.1.1 Public Cloud:-

Public cloud defines cloud computing in the traditional sense, where the resources are dynamically stationed on a fine-grained, self-service basis over the Internet, via web applications or web services, from an off-site third-party

service provider who shares resources and bills on a fine-grained utility on computing basis. It is typically based on a pay-as-per-use model, similar to a prepaid electricity metering system which is flexible enough to handle the increasing demand for cloud optimization.

There is less security in public clouds as it is open to everyone and therefore it increases the pressure on the public cloud deployment model and can be a target of many malicious attacks. A famous example of a public cloud is Microsoft Azure.

1.1.2 Private Cloud:-

Private cloud is a new term that some vendors have recently used to describe offerings that emulate cloud computing on private networks. It is set up within an organization’s internal enterprise datacenter.

In the private cloud, the resources and the cloud based applications provided by the cloud vendor are collectively combined together and are made available for the cloud end-users to share and use the services. It differs from the public cloud in a manner; that all the cloud resources and applications are managed by the service provider or organization itself, most likely to the Intranet functionality provided in an organization.

Utilization on the private cloud can be much more secure than that of the public cloud because of its specified internal exposure. Only the organization and designated stakeholders may have access to operate on a specific Private cloud. An example of a private cloud is Hewlett Packard Enterprise (HPE) which is a key leader in the private cloud market.

1.1.3 Community Cloud:-

These clouds are normally based on an agreement between business organizations such as educational or banking organizations. Infrastructure shared by various organizations for a shared cause and may be managed by a third-party service provider and rarely offered cloud model. A community cloud may exist locally or remotely. A regular example of a Community Cloud includes Facebook.

1.1.4 Hybrid Cloud:

Hybrid cloud is a type of cloud linked to one or more external cloud services, managed centrally, provisioned as a single unit, and restricted by a secure network. It provides virtual IT solutions through both public and private clouds. A hybrid cloud is a composition of a public cloud and a private environment, such as a private cloud or on-premises resources, that remain individual entities but are bound with each other, offering the advantages of multiple deployment models.

Hybrid Cloud provides more control of the application and data and allows various organizations to access data over the Internet. It has an architecture that allows

interfaces with other management systems. A hybrid cloud can describe configuration combining a computer with cloud services. Hybrid cloud architecture is a collective combination of private and public cloud architectures together with smooth integration. An example of a hybrid cloud is Amazon Web Service.

1.2 Cloud Service Model

The cloud services are hosted using the following service models:-

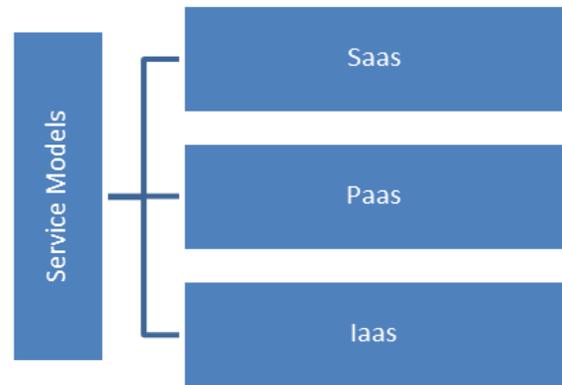


Fig -3: Service Models in the cloud

1.2.1 Infrastructure as a Service (IaaS):-

Infrastructure as a service (IaaS) refers to the sharing of hardware resources for executing services using Virtualization technology. Its main aim is to provide resources such as servers, networks, and databases and storage systems increasingly accessible by applications and operating systems. Thus, it offers on demand infrastructure services and uses the Application Programming Interface (API) for interactions with switches, hosts, and routers, and has the capability to add new hardware in a simple and crystal clear manner.

In general, the user does not manage the underlying hardware in the cloud infrastructure, but he controls the operating systems, storage, and deployed applications. The service provider possesses the hardware required and is responsible for hosting, running, and maintaining it. It is requested by the client and when permitted uses on a pay as per-use basis. The examples of Infrastructure as a Service include Amazon Elastic Cloud Computing (EC2), Amazon S3, and GoGrid.

1.2.2 Software-as-a-Service (SaaS):-

SaaS can be described as a process by which Application Service Provider (ASP) provides different software applications over the Internet. This makes the user get rid of installing, maintaining and operating the application on their own computer and also reduces a tremendous load of software maintenance; continuing operation, safeguarding, and support.

Software-as-a-Service vendor attentively takes responsibility of deploying and managing the IT infrastructure (servers, operating system software, databases, data center space, network access, power, and cooling, etc) and processes (infrastructure patches/upgrades, application patches or upgrades, backups) need to run and manage the full solution. SaaS points to a complete application offered as a service on demand.

There are mainly two types of servers that are used by SaaS, the first one is the Main Consistence Server (MCS) and the second one is the Domain Consistent Server (DCS). In SaaS, there is a Divided Cloud and Convergence Coherence mechanism whereby every data item has either the Read Lock or Write Lock so that deadlock is avoided and increases the efficiency of SaaS.

1.2.3 Platform as a Service (PaaS): -

Platform as a Service is the delivery of a computing platform. It is also a solution stack as a service without software downloads, licensing or installation for IT managers, developers, consultants or end-users. Platform as a Service is an infrastructure with a high level of integration in order to implement and test cloud applications.

The user does not control the infrastructure network, servers, operating systems, and storage, but he/she controls deployed applications. Some of the examples of Platform as a Service are Force.com, Google App Engine, and Microsoft Azure.

2. SERVICENOW

2.1 What is ServiceNow?

ServiceNow is basically a ticketing tool. It processes catalogs customer service requests. In ServiceNow, the user can raise a request for an incident, problem, change, service catalog and others.

ServiceNow is a company that provides software as a service (SaaS) for technical management support. ServiceNow provides both Platforms as a Service (PaaS) and Software as a Service (SaaS) offerings via its Now platform in a single-tenant architecture. ServiceNow works using a single-tenant architecture so that each customer gets their own copy or multiple copies of ServiceNow on the cloud. Such copies are known as ServiceNow instances. Users can

access an instance via a web browser using each instance's unique URL such as <https://companyname.service-now.com>.

ServiceNow provides three kinds of instances - the dev instance for development, the QA or test instance where the testing of a developed application is done, and the prod instance which is actually used by the end-users. ServiceNow uses a functionality called Update Set to capture all the development done in an instance. The update set makes it handy to move the developed application from dev instance to test instance and finally completely tested application to prod instance.

2.2 ServiceNow Applications

Some of the famous ServiceNow applications are as follows:

2.2.1 IT Desk

In ServiceNow, employees are provided with a self-service portal where they can avail IT Services by messaging the concerned department staff. ServiceNow was able to bring the ease of use of social media apps to the ITSM sector.

2.2.2 Resolving Security Threats

ServiceNow follows structured workflows which helps prioritize risks based on their severity and their effect on the organization.

Automated tools give this information inside the platform which reduces the time involved to under 20 seconds.

2.2.3 Human Research Service Delivery

Taking a decision is made easy with its famous and tracking tools. Human Resource is now powered with consumer-like customizable forms to deliver satisfactory service to employees.

ServiceNow wants to get rid of all manual processing. These tasks include different departments like IT, Legal, and Finance. ServiceNow's single platform can be used to connect Human Resource workflows with all these departments.

2.2.4 Customer Service Management

ServiceNow is converting Customer Service into a Team Sport. Unlike CRM (Customer Relationship Management) which is committed to customer engagement, ServiceNow Customer Service Management (CSM) works on the principle of connecting with the right people, systems, and workflows.

Customer Service is not restricted to just resolving customer tickets. Whenever a user is facing an issue, we need to find its cause. This will reduce case(tickets) count in the long run. ServiceNow comes with Service Mapping which

provides cross-functional information to discover the initial point where the error had first occurred.

2.2.5 Field Service Management

ServiceNow makes field service management very easy by changing email, spreadsheets and other management tools with only one system.

2.2.6 Finance Service Management

Finance Service Management in ServiceNow efficiently accomplishes submitted requests including financial reports, and payroll, procurement issues; gains visibility into work requests and trends over time.

2.3 ServiceNow Architecture

There is no structured architecture for ServiceNow. But we have drawn an overall architectural diagram from our perspective. Operation Management includes Discovery, Orchestration, Cloud provisioning, Event, Config Automation. Application development includes SDLC, App Creator, and Service Creator. Service Management includes Release, Incident, Problem, Change, Catalog, CMDB, Work, Human Resource, Facilities, Asset, Pass Reset. Business Management includes Governance, Vendor, Resource, Cost, Demand, Project and Analytics.

The Service Automation consists of Single Architecture, Shared Resource, Single Data Model and Custom App Development.

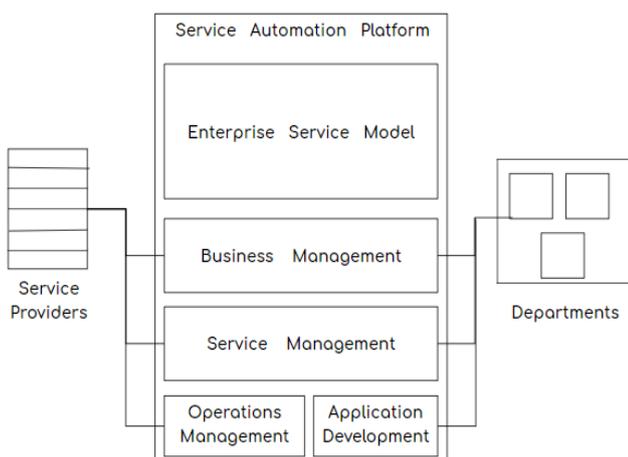


Fig -4: Flow Graph of Proposed System

2.4 Service Portal

Service Portal provides the users the frontend with which they will interact with the application or service.

Service Portal is a structure that provides administrators to build a mobile-friendly self-service experience for users. It communicates with parts of the Now Platform, so users can

enter into specific platform features using Service Portal. It is an alternative to the Content Management System(CMS) based on more modern technologies.

ServiceNow provides some pre-built templates for the service portal either you can use them or create new as per your requirement. Service Portal includes some important concepts like Widgets, Pages, etc. Functionality like widget or pages mostly provides reusability.

3. PROPOSED SYSTEM

In the proposed system we are offering a new application Platform as a Service (aPaaS) named ServiceNow to develop the system. We have taken university assessment and evaluation as a case study. In this system, we offer a secure and efficient service or application for examiners to evaluate the answer sheets and feed the result.

The examiner will be able to evaluate the sheets when they are assigned to him by his higher authority. Proper security would be maintained when the examiner will evaluate the answer sheet. When the examiner will log in before evaluating the answer sheets, the system will capture a picture of the examiner on an external webcam so as to maintain security.

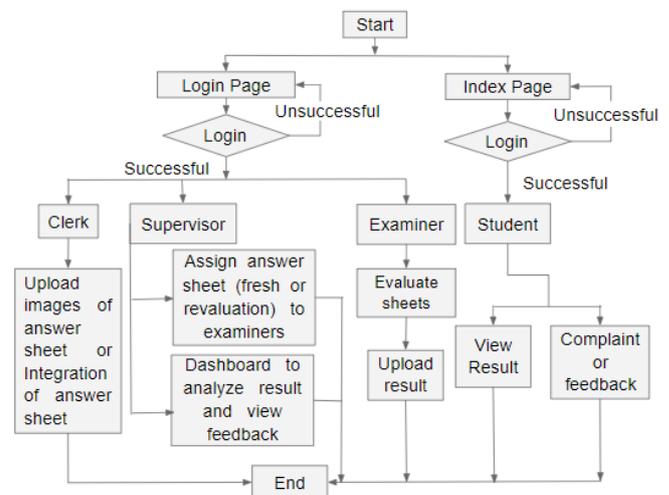


Fig -5: Flow Graph of Proposed System

After evaluating the sheets the examiner will fill the marks for the individual student and the process will continue for all the answer sheets assigned to him. We will also provide the functionality where a clerk will scan and upload the answer sheet or integrate the answer sheets from other systems like virtual examination systems into the proposed system. The higher authority of the examiner here referred to as the supervisor will assign the answer sheets to the examiner. The student will be able to view the overview of the result.

The clerk will only be able to add the answer sheets but he will be denied access to any other part of the system. The examiner will be able to view and evaluate the answer sheets that are assigned to him; he will not have any kind of access

to the other answer sheets. Similarly, the student won't be able to access any other part of the system. Only the admin of the system will be able to access the whole system. ServiceNow provides a feature called an Access Control List which paired up with other features called roles will provide a high level of data security.

A ServiceNow instance URL would be provided to the clerk, examiner, and supervisor. The student would be provided with a general URL. When the clerk, examiner, or the supervisor will access the URL the login page for the ServiceNow instance will open. For students, there will be an index page or the homepage which will contain some basic information about the university along with a form for students to log in.

Once the users, the clerk, examiner, and supervisor logs in they will be able to view the forms and records that they have access to. After login the student would be able to view their result and also the students would be able to raise their complaint or give feedback.

Upon unsuccessful login attempts the clerk, examiner, and supervisor will be again redirected to the login page while the student would be redirected to the homepage.

The supervisor will be able to set a deadline for the examiner to evaluate the answer sheet. There is a feature called Service Level Agreements in ServiceNow that can be used to define the deadline. The supervisor will also be able to view various reports on the dashboard designed particularly for him. The dashboard may include reports like the overall result of students, how many answer sheets on an average the examiners evaluate in a day, etc.

ServiceNow also provides some predefined fields like created, created by, updated, updated by, etc in all the tables which makes it efficient to track down the changes done by each user. This feature helps in the security and efficiency of the system.

3.1 Advantages of Proposed System

The proposed system has many advantages. They are as follows:

1. Data Security

The proposed system though being operated in a cloud or virtual environment will have more data security because of the features ServiceNow provides as a platform.

2. Cost-efficient

The proposed system will be cost-efficient because you don't need to buy huge configuration servers or databases or any other kind of hardware; along with that you also don't need any licensing software. Also, the cost required for man-power to manage these resources is also not required when you use ServiceNow or cloud computing techniques.

The only thing you need to pay is for the ServiceNow instance which is extremely cost-efficient.

3. Reduced time

The proposed system reduces the computing time required.

4. Efficient to use

The proposed system is efficient to use as it uses a cloud computing platform.

5. Helpful in situations like COVID-19

The proposed system can be used from anywhere around the globe at any given time so this helps the continuation of answer sheet evaluation work in lockdown times like COVID19.

4. CONCLUSIONS

Cloud computing is currently gaining popularity for sharing resources over a network from anywhere around the world. Cloud computing provides services like SAAS, PAAS, IAAS using these services accessing and sharing of resources takes place. The platform ServiceNow is secure and efficient to use.

In this paper we have proposed a system to ease the workflow of checking the answer sheets of university students. There will be four users namely Clerk, Supervisor, Examiner and Student with respective tasks. This system will surely make the process more trouble free and effortless.

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