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SOA 3.0, Cloud Computing and SaaS: A New Frontier

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Abstract

Cloud Computing, SaaS and the use of SOA in the business world is a rapidly growing phenomenon. In contrast to traditional software where organizations maintain technical staff and enough computer hardware to run their business effectively, SaaS and Cloud Computing is the beginning to change this background work of managing IT. SaaS have an incentive to release new features as soon as they are completed to the users. This paper shows the effectiveness of SaaS in an organization and the cost savings that lead the organization to enhance their goal to achieve loyal customer base. This paper provides an understanding of Cloud Computing and a comparison among current Cloud Computing providers. This paper presents a novel approach of SOA as SOA 3.0 or Achievable SOA, which can be used by organizations as a standard practice to get efficient and cost effective solutions to run their business smoothly.

1. Introduction

The Cloud is a loose union of millions of computers all over the world that provide data and available software as a service (SaaS) to process, display and communicate data with one another to share and exchange data in shape of textual, voice or video formats. The Cloud offers millions of users a way to find and share their relative information, conduct research, bamboozle around and an accelerated learning.

The devices that compose the Cloud to serve the users are servers situated at all across the globe as depicted in Figure 1.1. A user's need to process any data over Cloud is served by any or many of these servers using some specific piece of software applications designed and developed for the Cloud in shape of services. Several of these services are freely available to use, such as Google™ search facility or Amazon™'s finding a book. The servers providing such and many more services are stationed at data centers. It is a fact that the cloud is a combination of all of the data centers.

Figure 1.1: A Cloud with several Data Centers

There are two important terms mentioned in the given paragraphs, and those are software as a service or SaaS and Data Centers. Before we look in, what SaaS is all about, it is important to know, where SaaS runs to provide user centric services. Software enables computer hardware to serve the user, it is analogues to a live person or an animal. As long as soul is attached to a person, he/she is considered alive, works, eats, sleeps, talks and does several other activities, which we do in our daily lives. As soon as this soul departs from our body, a person is considered dead. And no one has ever seen a dead man walking, except in Hollywood movies. The data centers are the residence of powerful computing servers. These servers are considered alive using some software and energy source. This energy source is the electrical power. This power is provided by local area power grid stations and involves a cost to data center running body or the organization, which owns a data center.

Software utilized to run these servers of a data center is also being provided by several organizations and a cost is also attached with it. This cost involves licensing fees; upgrade patches development cost to the software providers etc. The computing hardware by itself comprises of several components, like our daily used computers posses. Figure 1.2 shows a portion of a data center containing servers in racks hooked with each other in a central network and linked with routing servers to serve the clients, like us using our daily

Google browsing or perhaps checking e-mails etc. This snapshot is provided by Kyle Anderson [1] Wikimedia Servers Front, Tampa, Florida, USA.

Figure 1.2: A Cloud Computing Data Center [1]

The cost to run a data center to provide services to user in a cloud has an associated cost, a discussion of this cost is given below to understand, why the cloud will be introducing costs to a user in future? This cost is mostly paid by the advertisers, who publish or broadcast their advertisements for the user to get the knowledge about their advertised products or services, which might or mostly might not be of any interest to a user of the cloud. The cost of one small business server to serve intra-organizational needs in a rack is given in the following table 1.1.

IBM [2]	**DELL** [3]	**HP** [4]	**MenDax** [5]
$1,649.00	$ 1,168.00	$ 1,104.00	$ 1,109.85

Table 1.1: A price comparison among several Data Center Servers

To run a data center a complete infrastructure is required, this infrastructure contains, a building containing massively built rooms for racks, that store these servers with network routers connecting these servers together and with outside organizations providing data communication services to the data centers, electric power to keep these servers running, a controlled temperature environment and much more.

The given Figure 1.3 depicts data center layer 1 contains the data processing and storage servers, connected with each other for efficient and fast data transmission. Layer 2 contains smart routers to balance the incoming request load [6] for layer 1 processing with firewalls to provide security to the communications. Layer 3 contains request receivers and response broadcasters. The Cloud is green, as it saves trees from getting chopped and makes consumers information available for their data processing needs.

The computers and thin clients such as Blackberries, iPhones, laptops etc use the Cloud to communicate in both synchronous and asynchronous way to one another as being loosely coupled networked devices. There are several forms of such connections found on the Cloud. Few computing devices are directly connected to others with wire or fiber-optic cables, and some are connected through local cable provided modems. The mentioned thin clients use satellite communications. Basically Cloud is a combination of services for the everyday users, who are provided these services by several service providers, the business community uses Cloud for its transparent and platform independence features to assist each other in providing services to their consumers.

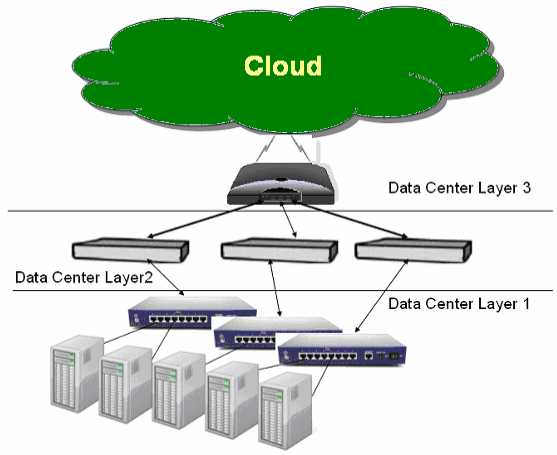


Figure 1.3: A combination of services for consumers

According to the definition by Gartner [7] "*Cloud computing is a style of computing where massively scalable IT-related capabilities are provided "**as a service**" using Internet technologies to multiple external customers"*. Figure 1.4 depicts a near to life Cloud Computing of today. We can consider following as services:

- Software
- Local Device Operating Systems
- Cloud provided Operating Systems
- Web Browsers
- Networks and related protocols etc.

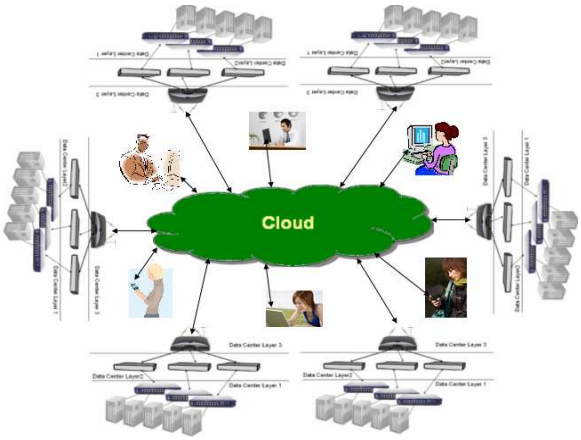


Figure 1.4: Cloud Computing

2. Cloud Computing Providers

Cloud computing is currently being provided by several service providers, we will look into few of these as an example, such as Amazon Elastic Cloud [8], EMC Atmos [9], Aptana [10] and GoGrid [11].

- Amazon Elastic Cloud [8] or EC2 is a web service along with Amazon SimpleDB, Simple Storage Service (Amazon S3), CloudFront and Simple Queue Service (Amazon SQS) that provides resizable computing capability with web-scaleable computing for developers.
- EMC Atmos [9] provides information distribution and multi-petabyte storage. This service merges automated data placement with substantial scalability to efficiently deliver content and information services anywhere in the world. EMC Atmos operates as a single entity using metadata and business policy on automatic basis to get the right information to the right location, at the right time. These combined features increase user organization's operational efficiency, reducing their technical management complexity, and is a cost effective solution.
- Aptana [10] Cloud provides on-demand scalability, pre-configured applications, Cloud management tools and access to hosted source control and staging servers for the users to work more efficiently for their business and their customers.
- GoGrid [11] provides an interface for the consumers by offering a multi-server control panel. This interface allows consumer to organize and administer load-balanced cloud servers in the period of few minutes.

3. Software as a Service or SaaS

We use computers everyday, almost everywhere. The use of computers brought change in our lives. The professional use of computer in the industry brought innovation. An innovation is another name of change with better and faster professional activities and does something new to retain and gain more business.

We have seen the use of computers as desktops and the use of networks combining these computers to be utilized more efficiently to produce more results at one time. The combination of hardware (computers), software (operating systems and various other applications such as Microsoft Office™ and other customized solutions) and networking technologies brought us an efficient and fast way to perform our day to day business needs. These business needs can be understood as manufacturing, shipping the goods, maintaining inventory or selling of these goods to consumers.

The professional duties involve several key factors. Such as mainly serving the consumers, maintaining goods availability, providing consumers best service etc. We do not see much change as a consumer in our day to day needs provided to us by the businesses around us. Automotive garages still provide us repair and maintenance to our vehicles; we still use phones, both land lines and cellular for our everyday telecommunication needs. Hotels still provide accommodations to the travelers and also provide them with meal options and this list goes on.

Mostly businesses do not change their practices very frequently. This means that the core business functionalities do not get changed over a certain period of time. The innovation comes to get change on the background of a business, such as bringing in new products, ideas with costs to attain more consumers and their attention and maintain same core business as usual. Any industry needs to survive and to survive they sometime have to do some vital changes on this background of their core business functionalities. The introduction of new product lines, marketing campaigns, promotional advertising, etc. can be a good example to understand this background change. These changes are mostly introduced as services to the consumers, and SOA is the paradigm used to design and develop these services.

SaaS or software as a service is a model, where software is provided by a vendor, like an ISP or a cable company provides an internet connection and charge their services on a certain period, which can be a monthly or quarterly charge for the provided service. The service provider in this case is the IT infrastructure of a hosting company, which runs the software at their data center and let the consumer use their services under a certain agreement among service provider and user. SaaS is an on-demand commodity and is available in Cloud from several service providers. SAP™ and Oracle™ are couple of good examples as SaaS providers. The users pay only for the services they use.

The disadvantages of SaaS can be the limited personalization or tailoring of the applications as the core functionality is out-sourced and you as a user have to bend your procedures according to available modules of the application you are willing to use for your organization. In case, if the service provider's network has some malfunction, you as a user are not in any control to take any immediate steps to route your business procedures to another server or another service provider.

An interesting question arises here, who can take the most advantage using SaaS? The answer is smaller

and medium sized organization, as SaaS can be adopted with ease of installation, training to be a computer operator, is not that big deal, as most of us use computers almost everyday. This means the organizations do not need much of technical staff. The sales and marketing force of the organization can work out of the office from home or on the street, in a shopping mall etc. The management can even work while traveling for any conference, meeting with clients or any other official needs. The organizations save by not installing expansive hardware as mentioned in Table 1.1. Much of the network in-office cabling is not needed as well.

Google [12] has started providing Google Docs, this service is free and let the user process several types of documents, while the user is just using the simple browser, with several rich features like we are used to utilize in our daily routines in out installed document processing software at our local computing device.

4. Related Work of SaaS

As per Goth [13] Software-as-a-Service (SaaS) has acquired the focus of software and related technology people on the new business model that enables software on-demand for an organization. Goth also illustrated in his article that pioneers of SaaS have seen "*a new era dawning where the obstacles to communication between users and programmers—and sometimes the lines differentiating those roles themselves—are much diminished*". The rise of SOA design and advancement of new development models, as well as Web services standards will cause the change in the solutions development in a drastic way from traditional software development modeling methodologies.

The usage growth of SaaS in several organizations is over 20% a year, in comparison to the traditional software increase, which is in a single digit [14]. Sathyan et al. [15] have introduced a new method that is to facilitate customers in search for services across multiple service providers to take the benefits of services offered by other service providers simultaneously. Authors also have taken basic tenet of unified service experience in consideration in the design of this new approach. They claim that their approach is standards-based and maintains the utilization of existing messaging protocols to transfer inter-services messaging. Sathyan et al. made sure in their approach to have large amount of flexibility with regards to the client, in terms of OS, platform etc. They also considered the convenience of the customer's service experience as convenient as possible, along with hiding the inherent complexity involved in providing the service assembly.

5. SOA - Unleashed

Software engineering community has seen several ups and downs in the history of software development. It is an important factor that any software application, which need a continuous or near to continuous change needs to be separate from the application, which is consistent and does not require much change on sporadic basis. Service Oriented Architecture or SOA is the application of this understanding of software engineering community on the knowledge management of a business. Let us take an example to explore SOA. Each puzzle piece given in Figure 4.1 is a service provided by a retailer, travel agency, bank or a government service provider. These services are mostly available across the globe, as we live in the world of global business.

Figure 4.1: Several services for the consumers

Figure 4.2 depicts the servers providing these distributed services across the globe. It is a very well known fact, the due to the availability of internet almost all across the world; it is possible to access any of this service as per the user's requirement.

Figure 4.2: A distributed view of services

The magic of SOA works for both consumers as well as industrial internal operational and managerial users. The use of SOA generates the shown structure of these services in Figure 4.3.

Figure 4.3: The magic of Service Oriented Architecture

5.1 Evolution of SOA. SOA evolved in stages over last few decades, since the automation of the industry started taking rapid growth. The services we use currently usually deal with our data as input and output

for both us and other systems or services to process our request to respond with. These services orchestrate our data in generating messaging among each other and back to us as well. The operational users of these services simultaneously can monitor or manage our requests, these operations can also be done by mediator service designed to follow the agreed policies and procedures among each of these services. Each service is owned and governed by a business entity and works in a certain body of rules defined by the policy makers.

SOA makes the changes easier to get developed ever changing applications getting data with stationary applications as well as maintain a decoupled relationship with these applications on simultaneous basis. SOA brought in a fresh approach for the businesses information technology departments with ease in assembling and configuring the IT components like building blocks, which can be fixed together as shown in Figure 4.3. This building is to provide easy and fast solutions. These components can be understood as a complete service, which a business is to provide. Such as a bank provides a line of credit by checking a consumer's credit, an automotive spare parts seller checks the inventory; a postal service maintains the shipping status for consumer's delivery etc.

SOA 3.0 proposes ASOA-SRD, which introduces a novel service design methodology for the businesses to adapt and get cost effective and efficient services design, development and deployment.

6. SOA and Related Work

SOA is a methodology that interconnects businesses and their computational assets, such as software in use, current system applications and human resource of the organizations involved in to get a SOA solution design, develop and get deployed. These assets are used to achieve the results by the use of newly deployed service(s) for consumers. These consumers can both be customers as well as operational users. The use of web services is on increase these days to get more consumership and enhancement of business across the globe.

Software architecture is a vital part of software engineering and Service Oriented Architectures (SOA) is an advanced architectural concept with significance. The services designed by software engineers using SOA are loosely coupled and reusable, Dorner et al. [14] have brought forward few considerations of SOA in terms of End User Development (EUD). In their research work they have analyzed the development of adaptable systems as a potential of SOA for and propose challenges, which need to be solved to get an effective EUD. The analysis is based on requirements for EUD systems and empirical studies, taken from earlier research work [15]. Dorner et al. have suggested in their study, that SOAs can be extended with structures for in-use modifications or even beyond software technologies, the design of user-adaptable next-generation systems is also possible.

Due to the SOA provided flexibility the new tailorable systems can be produced and platform-independence can also be achieved. The service designed using SOA are formulated software applications and this formulation is closer to the domains of the business world. It is also been found in this work that the call for additional metadata of service descriptions is growing fast and the amount of data collection of use experiences with a service needs to be stored for the analysis of service and its future use. This data handling in terms of storage locations and synchronization raises issues and serious concerns about service performance. The service can have performance issues in terms of message communication to and from user to the service provider due to this additional contextual information. This research work has found that requirements of EUD of a service may involve extending protocol and server structures of SOA standards.

Several business processes and service design methodologies have been developed and introduced in last couple of years. Lin et al. [16] and Korherr et al. [17] provided comparisons of these methodologies in several surveys. Several designers at different organizations used UML notations and few used some [18, 19, 20] special notation approaches.

Event-driven Process Chains (EPCs) [21] is another prominent approach for requirements modeling for business process designing purposes. This type of modeling represents the dynamic performance of activities associated to specific business process requirements by focusing on depicting control flow dependencies among several different process functionalities. There is a drawback using EPCs, and that is the extension the user's provided requirement information, where EPCs already have stored static information, creates havoc, as there is no such support provided to deal with this information addendums.

Kim et al. [22] worked on conceptual modeling and Kramler et al. [23] have produced work on web service collaboration Protocols for inter-organizational business processes. Due to the use of SOA and related methodologies web services and XML have gained significance. This use of XML has introduced in the design world of software engineering XML-based notations. These new set of notations are being utilized to implement business processes modeling designs development. As per the work done in [24, 25] Web

Services (BPEL4WS) and as described in [26] Business Process Specification Schema (BPSS) are the most trendy languages in the area of business processing.

OMG or Object Management Group has introduced a new approach in 2006, which they have developed [27], and called it BPMN or Business Process Modeling Notation. This approach introduced a single graphical modeling notation for all stakeholders involved in a requirement design. The research work done by Karhunen et al. [28] provides us the study of a framework for SOA, which creates a well defined business case using UML and BPMN diagrams containing business processes and the business requirements.

This background study shows a definite lacking of a robust and uncomplicated straightforward methodology. This paper proposes a new robust paradigm and that is SOA 3.0.

7. The Need for a Robust Methodology

The need for a robust modeling methodology becomes ever more essential for the complex and interdisciplinary nature of systems in the business world to efficiently adopt SOA. The system design needs to be communicated among all stakeholders as a visual representation of the required solution. To draw this visual representation, as a systems analyst or software engineer, it is our job to convert tacit knowledge of requirements to explicit knowledge. This conversion of documentation into a conceptual model is then used to get the required solution designed and developed.

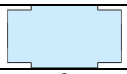
Task	Notations
Initiation, Finalization, Continuation Marker	
Requirements Elements	
Single Element	
Communication Links	
Processing Operator	
Conditional Operator	
Service (Block)	
User	

Table 7.1: ASOA-SRD or System Requirements Design Methodology

SOA 3.0 introduces ASOA as a new paradigm for the SOA solutions; it is called SRD or System Requirements Design methodology. An introduction to SRD diagrammatic notations is given in Table 3.1. Human mind can do chunking within seven plus or minus two things at one time. ASOA-SRD contains eight diagrammatic elements to draw a design with. Every ASOA project is to begin with an "Initiation Marker" and completes with a "Service (Block)". A service block is a simulation of a physical building block and can be reused for any other services combination project. A stakeholder can be a consumer, user or a member of the service design team.

A service block is created by using different service requirement elements. It is analogues to a physical building block, which is usually prepared with cement and water combination, where cement is made from lime, silica, alumina, iron oxide and gypsum and it is a known fact that water is combination of two elements Hydrogen and Oxygen.

8. SOA 3.0 at Work

As SOA has posed several challenges, this paper drills down few of these challenges, where SOA 3.0 can be helpful to users of Cloud Computing. The challenges are as follows:

1. Flexibility is required
2. Increasing demand of consumers to have standardized services with a seamless experience in their daily lives, such as users and their data communications
3. It is the most important factor for any business to reduce the operational cost of these services by getting satisfactory service results with improvement by having efficiency, which means users to control their business rather technology

SOA 3.0 or ASOA methodology provides model designing, and this modeling is flexible. It is a known fact that Cloud computing provides scaling and transparent data communications to the users. The cloud service providers maintain these unique features for their users and these features pose no issues for the users to divert their attention to fix their technical problems and spend more to maintain their IT infrastructure. The Cloud Computing is composed of many types of hardware, software and various operating systems.

SOA 3.0 or ASOA provides (organizations) users to pursue their natural desire to work together to solve their widespread issues and day to day needs. By using

ASOA users can get organized using their required services designed that they need. It is also a fact that we live in the world of complex human relationships. The use of Cloud computing is based on mutual symmetric trust among services users and service providers. Service requirements tend to change with the pace of business needs change, ASOA provides service designing to model services that are flexible for any such predictable situations.

The service providers using Cloud can develop a large body of web services that can be distributed among services users with acceptable service level agreements (SLAs). The utilization of Cloud computing will be getting increased with the pace of time. SOA 3.0 over Cloud computing is a new discipline, introducing new fundamental concepts, where the need of service designers and providers is on increase.

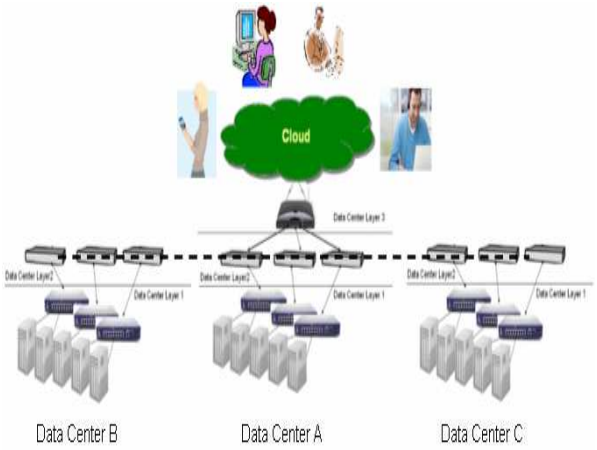


Figure 8.1: A combination of services for consumers

Figure 8.1 depicts the following in a set sequence of 3 vital stages:

1. Data center layer 1 contains the data processing and storage servers, connected with each other for efficient and fast data transmission.
2. Layer 2 contains smart routers to balance the incoming request load [6] for layer 1 processing with firewalls to provide security to the communications.
3. Layer 3 contains request receivers and response broadcasters. The Cloud is green, as it saves trees from getting chopped and makes consumers information available for their data processing needs.

8.1 SOA 3.0 Proposed Services Framework: This paper proposes a novel services framework, which can be adopted by the industry to get cost effective and efficient services for their internal users as well as for customers. The example given in this paper is based on actual business practices of a real estate business. The combination of several service provided by a consortium of real estate companies are shown in the Figure 8.2. These services coordinate with each others on a Cloud and only one service has the user front-end. It does not matter, whether ABC Real Estate is using Windows as operating system or XYZ Real Estate is using a LINUX as an OS.

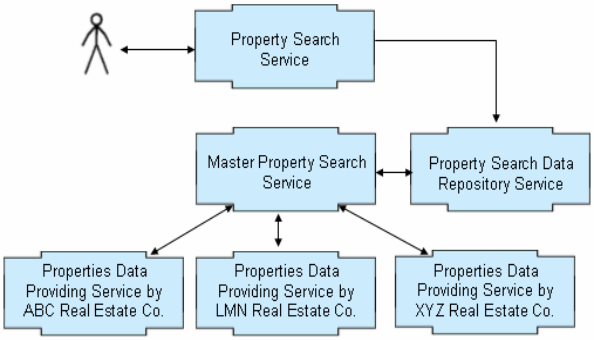


Figure 8.2: Combination of several services in a Cloud

8.2 Use of Map-Reduce: Map-Reduce [29] is a combination of function Map and function Reduce. This combination was first successfully used for Google search facility at Google Labs, due to the giant datasets sometimes larger than a Terabyte of data as an input request by hundreds or users, it is obvious that this processing clearly was not going to happen on one server or even on one data center as shown in the given Figure 8.3. It is going to take several hundred or may by a thousand CPUs to Crunch a Terabyte of data in a reasonable amount of time. The research teams at Google wanted to make this search process involving several data centers, easy and faster for users. This was the basic reason that Map-Reduce was introduced as a framework which provides this automatic parallelization and distribution to find document(s) requested by a search user. The use of Map-Reduce is given below in ASOA Service proposal for Cloud computing:

Map-Reduce provides fault-tolerance as one of the important features, as this combination of functions tries to access thousands of computers, it is a possibility, that one of them is going to probably be crashing or having a faulty network card in any point in time. Map-Reduce also provides status and monitoring tools in the shape of data hosted address, where the correction is found in the data repository service "**R**" as shown in the Figure 8.3, so that data center administrators can be sent the fault information to get their server(s) fixed and get it up and running.

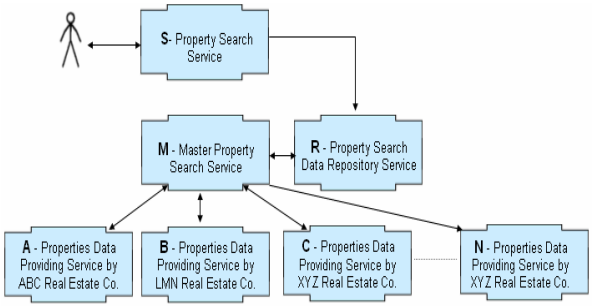


Figure 8.3: Application of Map-Reduce in ASOA proposal for Cloud

The Map-Reduce [29] model is given below:

```
Map (String key, String value):
        //key: document name
        //value: document contents
        for each word w in value;
                EmitIntermediate (w, "1");

Reduce (String key, Iterator values):
        // key: a word
        // values: a list of counts
        int result = 0;
        for each v in values;
                result +=ParseInt(v);
                Emit (AsString (result));
```

- It is obvious that Map-Reduce will work on a list of Key-value pairs, so each map function is going to takes an input key and input value and it is going to return one or more output values with their own (intermediate) values, with their own output keys.
- The reduce function takes all the intermediate values for a given output key and creates a list of final values that have been created by the aggregation through them.

The values that are fed into the mapper are some kind of records from some data source which may be some lines out of a file or some database rows etc. and each of these input values comes with some sort of a input key, the map is going to produce intermediate values along with an output key from the input. After the map phase is over all the intermediate values from all the different mappers are combined together into a list for a given output key which is turned into a final value or a list of values.

The parallelism that gets created by Map-Reduce comes from the fact, that all of these different map() functions run in parallel and all of them are using totally different input datasets, since each mapper can't see the other input datasets there is no synchronization between them. They just start writing their output values and can be run in different address spaces in the Cloud for all users at various locations, requesting to access their required search.

The reduce functions can also be run in parallel because the output keys are constrained to be working on separate datasets, the only bottleneck in this process is that the reduce function can't start until the map function is completely finished. In case one mapper is not able to produce a resultant dataset, the reducer will remain idle.

In SOA 3.0 proposed framework, Map-Reduce is used, if each shape [30] in the given Figure 8.4 is considered as a service provided by a service provider (a business) and a requester service or a user requests to use few or one of these services, the figure given will be the exact simulated replica of such a processing:

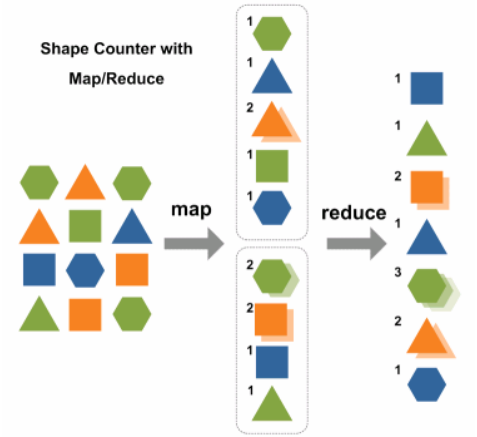


Figure 8.4: The use of services using Map-Reduce

8.3 Use of Services in a Cloud. The use of Cloud computing provides a user (an organization) computing resources, which can be utilized by the user on-demand with the increase or decrease of computing servers, network bandwidth and storage, and these utilizations are subject to an SLA or service level agreement among user and the Cloud computing services provider. The cost can vary with the utilization increase and decrease. Figure 8.7 and 8.8 shows an internal service communication among several services within a Cloud.

The service **S** executes a search request for a property for sale on a repository **R**. If the requested data is not available service **R** generates a request as shown path 5 in Figure 8.5 to the Master search service **M**, which generates a query from registered service with it as data providing services. Data repository service **R** delivers the data with using return path **r** to property search service **S** the required data, if it is

available from previous searched data. In other case the Master Service **M** will find data and send it to Data repository service **R**.

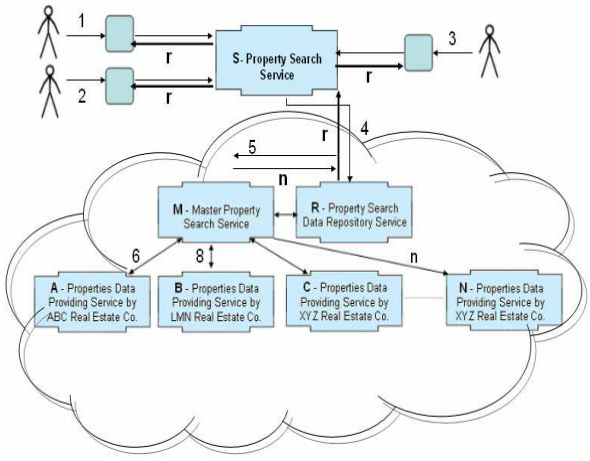


Figure 8.5: Requestors Servicing output

Let us denote the diagrammatic notations as given in Figure 8.6.

Figure 8.6: Notating Service **M** as a start/end service Marker.

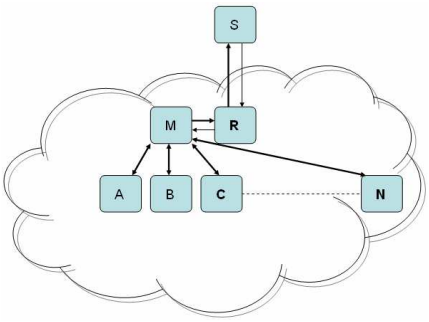


Figure 8.7: Services available in the Cloud

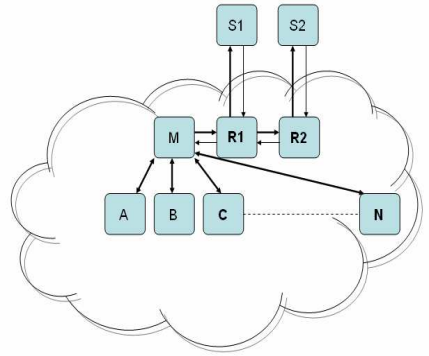


Figure 8.8: Utilization of two services S1 and S2

In case, if there is a second user willing to get information about some properties available for Short Sale uses another Service **S2**, which will find the data available by the Short Sale Data Repository of **R2**, the search transaction will be able to query repository **R1**, which might contain some properties, which might be on short sale and were searched by user 1 in a complete combination of all available properties on sale by several property selling companies. In case if **R1** does not have any data the request will move to service **M** for further research. This example illustrates that a Service can be understood as a self-describing black-box like function, which can be called by another service or an application via its URL address that will provide resultant data set in response to request by a service user or by another service.

An interesting question can rise here, about scalability, as per SLA or service level agreements between the providers of service **M** and **R1**, if the data should not be increased from a certain storage, let us assume 30 GB is the agreed limit, otherwise the charge of the service will rise as well or some older data should be removed to get new data stored for future availability.

9. Conclusion

The simulation in Section 8 makes it clear that SOA 3.0 proposed ASOA-SRD is robust methodology, and a single diagrammatic design done in ASOA-SRD benefits its audience through uniformity, relative unfussiness, and ease of learning to use for Cloud Computing. As we all know that a UML [31] [32] model is a combination of segregated sub-models with scattered multiple views spanning across dissimilar diagram sets. This is yet an added cause of complication in confining and understanding the modeled design in its entirety.

The ambiguity of current UML semantics presents relations between models constructed using the language on one side and the subject that is being modeled on the other side. This ambiguous situation with UML can create understanding issues for the involved stakeholders, where as SOA 3.0 proposed ASOA-SRD provides a prototype through the introduction of consistent and explicit set of system designing concepts and understanding of requirement definitions for all stakeholders on equal basis. The proposed SOA 3.0 methodology caters to the needs of the latest paradigm SOA and related solutions, designing with sufficient illustration of both static and dynamic services for the well-informed consumer of this age. The simplicity of SOA 3.0 methodology is the provision of an integrated services modeling approach and can be used by both Cloud users and service providers.

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