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# Cloud Computing Outline Study for Computer Visualization

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***Abstract: The Cloud computing offers the prospective to help scientists to practice or perform considerable number of computing resources often necessary in machine learning application such as computer Visualization problems. This suggestion would like to show that which benefits can be obtained from cloud in categorize to help medical image analysis users (its including scientists, clinicians, and research institute etc). The same as safety measures and privacy of algorithms are significant for most of algorithms' inventors; these algorithms can be out of sight in a cloud to allow the users to use the algorithms as a put together without any access to see or change their inside. In an additional word, in the user part, the users send their images to the cloud and put together the algorithm via an interface. In the cloud part, the algorithms are applied to this image and the results are returned back to the user.***

***Keywords: Cloud computing, machine learning, computer Visualization, Internet-based computing.***

## 1. Introduction to Cloud computing

The Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. In cloud computing, the word cloud also phrased as "the cloud" it's used as a metaphor for "the Internet," so the phrase cloud computing means *"a* type of Internet-based computing," where different services such as servers, storage and applications are delivered to an organization's computers and devices through the Internet. The Cloud computing is comparable to grid computing, a type of computing where unused processing cycles of all computers in a network are harnesses to solve problems too intensive for any stand-alone machine. The Cloud computing relies on sharing of resources to achieve coherence and economies of scale, similar to a utility (like the electricity grid) over a network. At the foundation of cloud computing is the broader concept of converged infrastructure and shared services. it's should maximize the use of computing powers thus reducing environmental damage as well since less power, air conditioning, rack space, etc. is required for a variety of functions.

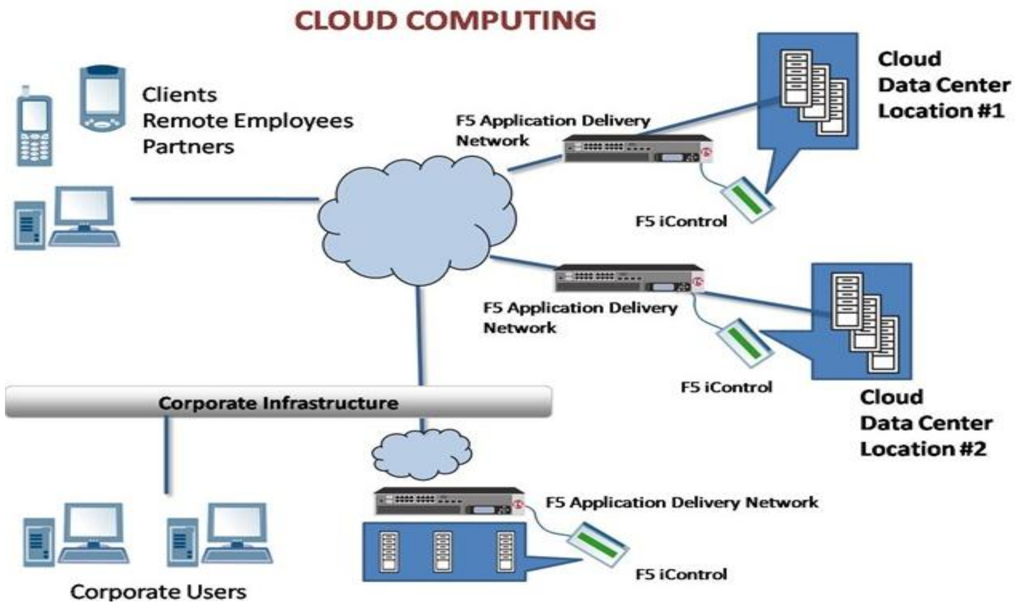


**Figure** *1 Showing the Cloud computing Environments*

The Cloud computing has become a source of enormous buzz and excitement, promising great reductions in the effort of establishing new applications and services, increases in the efficiency of operating them, and improvements in the ability to share data and services. Indeed, the cloud computing has a bright future and envision a future in which nearly all storage and computing is done via cloud computing resources. But, realizing the promise of cloud computing will require an enormous amount of research and development across a broad array of topics. It was established to address a critical part of the needed advancement: underlying cloud infrastructure technologies to serve as a robust, efficient foundation for cloud applications. The research agenda is organized into four inter-related research "pillars" or themes architected to create a strong foundation for cloud computing of the future:

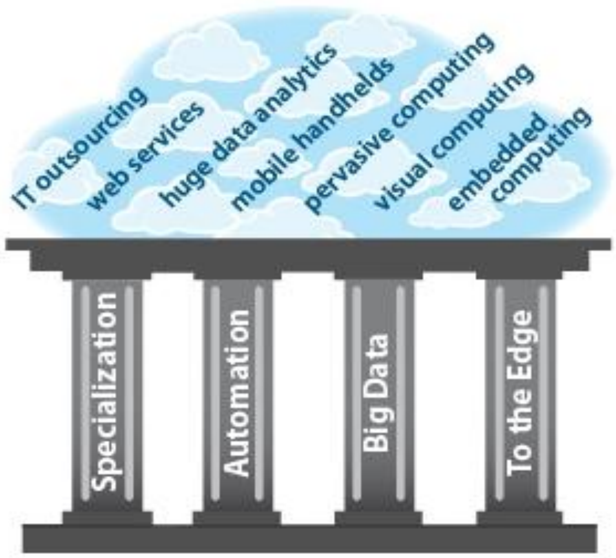


***Figure** 2 Showing the strong foundation for cloud computing of the future, delivering cloud's computing*

**I. Specialization**

The greater efficiency is a significant global challenge for cloud datacenters. The Current approaches to cloud deployment, especially for increasingly popular private clouds, follow traditional data center practices of identifying single server architecture and avoiding heterogeneity as much as possible. IT staff have long followed such practices to reduce administration complexity homogeneity yields uniformity, simplifying many aspects of maintenance, such as load balancing, inventory, diagnosis, repair, and so on. The Current best practice tries to find a configuration that is suitable for all potential uses of a given infrastructure. To Realizing this vision will require a number of inter-related research activities are following.

- To Understanding important application classes, the trade-offs between them, and formulating specializations to optimize performance.
- To Exploring the impact of new technologies like non-volatile memory (NAND flash, phase change memory, etc.) and Creating algorithms and frameworks for exploiting such specializations.
- To Programming applications so that they are adaptable to different platform characteristics, to maximize the benefits of specialization within clouds regardless of the platforms they offer.

In addition, the heterogeneity inherent to this vision will also require new automation approaches.

**II. Automation**

As computer complexity has grown and system costs have shrunk, operational costs have become a significant factor in the total cost of ownership. Moreover, cloud computing raises the stakes, making the challenges tougher while simultaneously promising benefits that can only be achieved if those challenges are met. The Operational costs include human administration, downtime-induced losses, and energy usage. Administration expenses arise from the broad collection of management tasks, including planning and deployment, data protection, problem diagnosis and repair, performance tuning, software upgrades, and so on. Most of these become more difficult with cloud computing, as the scale increases, the workloads run on a given infrastructure become more varied and opaque, workloads mix more (inviting interference), and pre-knowledge of user demands becomes rare rather than expected. And, of course, our introduction of specialization (Pillar 1) aims to take advantage of platforms tailored to particular workloads.

Automation is the key to driving down operational costs. The key automation challenges related to efficiency, productivity and robustness, with three primary focus areas:

- Resource scheduling and task placement: devising mechanisms and policies for maximizing several goals including energy efficiency, interference avoidance, and data availability and locality. Such scheduling must accommodate diverse mixes of workloads as well as specialized computing platforms.
- Devising automated tools for software upgrade management, runtime correctness checking, and programmer productivity that are sufficiently low overhead to be used with production code at scale.
- Problem diagnosis: exploring new techniques for diagnosing problems effectively given the anticipated scale and complexity increases coming with future cloud computing.

**III. Big Data**

The Data-intensive scalable computing (DISC) refers to a rapidly growing style of computing characterized by its reliance on large and often dynamically growing datasets ("BigData"). With massive amounts of data arising from such diverse sources as telescope imagery, medical records, online transaction records, checkout stands and web pages, many researchers and practitioners are discovering that statistical models extracted from data collections promise major advances in science, health care, business efficiencies, and information access. In fact, in domain after domain, statistical approaches are quickly bypassing expertise-based approaches in terms of efficacy and robustness. New frameworks for supporting DISC analytics of Big Data in future cloud computing infrastructures. Three particular areas of focus will be following:

- To Understanding DISC applications, creating classifications and benchmarks to represent them, and providing support for programmers building them.
- The Frameworks that more effectively accommodate the advanced machine learning algorithms and interactive processing that will characterize much of next generation DISC analytics.
- The Cloud databases for huge, distributed data corpuses supporting efficient processing and adaptive use of indices. This focus includes supporting datasets that are continuously updated by live feeds, requiring efficient ingest, appropriate consistency models, and use of incremental results.

**IV. Edge**

The Future cloud computing will be a combination of public and private clouds, or hybrid clouds, but will also extend beyond large datacenters that power cloud computing to include billions of clients and edge devices. This includes networking components in select locations and mobile devices closely associated with their users that will be directly involved in many "cloud" activities. These devices will not only use remote cloud resources, as with today's offerings, but they will also contribute to them. Although they offer limited resources of their own, edge devices do serve as bridges to the physical world with sensors, actuators, and "context" that would not otherwise be available. Such physical-world resources and content will be among the most valuable in the cloud. The effective cloud computing support for edge devices must actively consider location as a first-class and non fungible property. The Research will devise new frameworks for edge/cloud cooperation. Three focus areas will be following:

- Enabling and effectively supporting applications whose execution spans client devices, edge-local cloud resources, and core cloud resources, as discussed above.
- Addressing edge connectivity issues by creating new ways to mitigate reliance on expensive and robust Internet uplinks for clients and Exploring edge architectures, such as resource-poor edge connection points vs. more capable edge-local servers, and platforms for supporting cloud-at-the edge applications.

My proposal has two parts:

- Investigate the potential of cloud computing for computer Visualization problems.
- Study the components of a proposed cloud-based framework for medical image analysis application and develop them (depending on the length of the internship).

The investigation part will involve a study on several aspects of the problem including security, usability (for medical end users of the service), appropriate programming abstractions for Visualization problems, scalability and resource requirements. In the second part of this proposal I am going to thoroughly study of the proposed framework components and their relations and develop them. The proposed cloud-based framework includes an integrated environment to enable scientists and clinicians to access to the previous and current medical image analysis algorithms using a handful user interface without any access to the algorithm codes and procedures.

## 2. Inspiration to combine the Medical Image Analysis resources

In medical image analysis, a cloud can be defined as a framework between users or customers and resource providers. The Unifying these resources (including existing algorithms, hardware, images etc.) in a cloud is important due to several reasons. Four major reasons are the following.

- When a researcher addresses a new challenge for the analysis of medical images he/she must consider existing solutions to determine if they are suitable or not. In general, the reimplementation, when the software is not available for that explanation or the reuse of a resolution might be limited by a range of instances. For the instance and implementation details are not enough or the researchers are not recognizable with programming languages or even the solutions are not compatible with their own improvement environments.
- The Medical image analysis (MIA) the researchers spend around 35% of their research time for implementing and the evaluating existing solutions, which represents a important amount of time. Moreover, the assessment and validation of the new software solutions is limited by the way that these applications are deployed.
- User interfaces is a big challenge for MIA researchers as they need to spend additional time to define a suitable interface for visual input data and present the results when advance visualization is needed. MIA researchers are often concerned about proving concepts and learning new programming languages, and image and visualization techniques sometimes is not an option.
- The generation of ground truth outlined shapes is relevant for the validation of image segmentation algorithms. Ground truth, in the image processing scenario, consists in examples of target shapes that image segmentation should ideally provide as results. These shapes are generated by either radiologists or MIA researchers by means of manual segmentation, which is often, performed using the mouse. This could be both tedious and time consuming.
- For some researchers sharing information is quite a challenge as they believe their research is threatened when their data and algorithms are used by someone. Even though the creation of data repositories along research centres and universities has been accepted as a way to preserve and disseminate research data, sharing algorithms and software solutions is still a challenge.

By the unifying all image analysis resources in one environment, cloud computing helps the medical image analysis researchers to test their new algorithms, visualize the results and compare with other algorithms by applying on standard ground truth images without spending time and energy. Also, as users have independent access to remote computing services in a cloud computing framework, then sharing resources becomes safe and secure.

## 3. Proposed Skeleton or Framework

An appropriate to the enormous number of programming languages and picture processing toolkits, easy sharing of the resources as plug and play functionality is difficult. Although the proposed cloud computing framework in Figure. 3 allows a proposal to have an independent access to remote computing services, its web services allow to the end-users to fully work together with data, information requests as well as applications with a low level of user communication. In this proposal, I am going to study different components of this framework and expand them using accessible software solutions, imaging toolkits and Microsoft technologies. For the instance, Visual Studio can be utilized as the development environment, the SQL server as the database manager, and Microsoft Workflow foundation as the workflow engine.

A number of the work packages have to be considered/developed for this framework:

To evaluate the existing software environment solutions are following.

- To Design standard datasets, metadata and web services.
- To Design workflow orchestration and enactment, for example by Windows Workflow Foundation.
- To incorporate existing imaging and visualization toolkits.
- To Design mechanisms and tools to enhance software usability for clinicians.

A number of challenges have to be addressed. The variation of obtainable software will require an analysis and may require significant time. In addition merging toolkits with different languages (such as Matlab, Java and C++) and their communication will need a deep study. The design and development of suitable user interfaces for clinicians is another challenge. The design is to use multitouch technology to get better the interaction with image analysis applications in addition to the learning experience. As a final point, the contributions not only should meet the excellence but also make possible the way researchers do it. The design of mechanisms to make available such facility must be analyzed and evaluated.

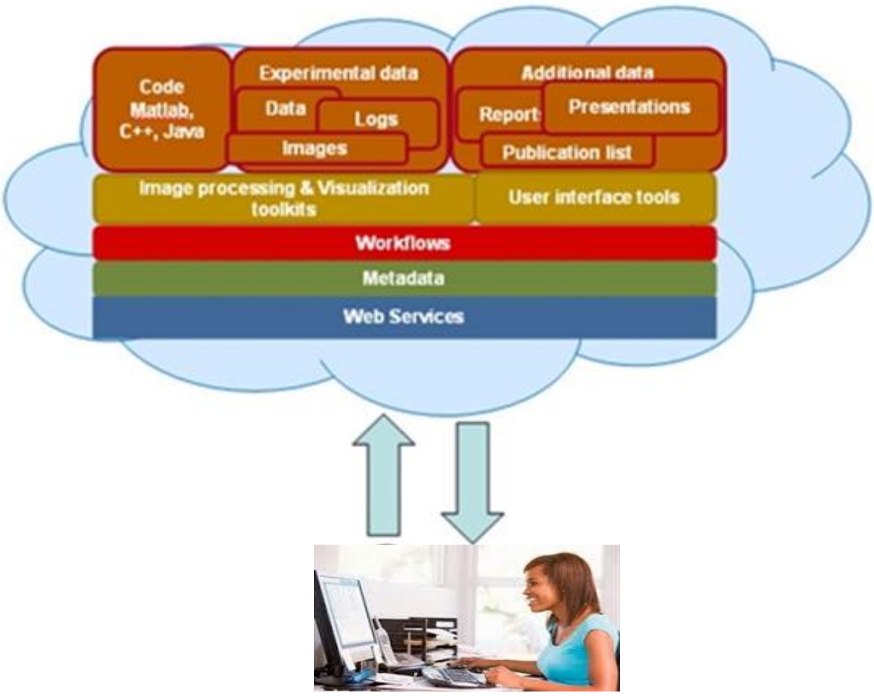


**Figure**.3 *The proposed structure for medical image analysis application on cloud Cloumpin*

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