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Model of Quantum Computing in the Cloud: The Relativistic Vision Applied in Corporate Networks

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Abstract: - Cloud computing has is one of the subjects of interest to information technology professionals and to organizations when the subject covers financial economics and return on investment for companies. This work aims to present as a contribution proposing a model of quantum computing in the cloud using the relativistic physics concepts and foundations of quantum mechanics to propose a new vision in the use of virtualization environment in corporate networks. The model was based on simulation and testing of connection with providers in virtualization environments with *Datacenters* and implementing the basics of relativity and quantum mechanics in communication with networks of companies, to establish alliances and resource sharing between the organizations. The data were collected and then were performed calculations that demonstrate and identify connections and integrations that establish relations of cloud computing with the relativistic vision, in such a way that complement the approaches of physics and computing with the theories of the magnetic field and the propagation of light. The research is characterized as exploratory, because searches check physical connections with cloud computing, the network of companies and the adhesion of the proposed model. Were presented the relationship between the proposal and the practical application that makes it possible to describe the results of the main features, demonstrating the relativistic model integration with new technologies of virtualization of *Datacenters*, and optimize the resource with the propagation of light, electromagnetic waves, simultaneity, length contraction and time dilation.

Key-words: - *Virtualization, Datacenters, Relativity, Quantum Mechanics, Corporate Networks.*

I. INTRODUCTION

To offer companies the opportunity to dissociate their information technology needs and of your cloud computing infrastructure is able to offer, in the long run, savings companies, included the reduction of infrastructure costs and payment models based on the use of services (2009 ISACA). The low cost of cloud computing and its ability to dynamically resource expansion make it boost innovation for small business in development (VAJPAYEE, 2011). According to Fusco and Sacomano (2009), the network of companies and the importance of communications in environments of computer networks have been important in the world of modern business and social networks, because the reality is increasingly volatile and dynamic has brought the need to speed up processes, business and organizations, therefore internationalize should be the presence of competitive thinking and strategic alignment of that reality. According to Tonini, oak and Spinola (2009), for competitive advantage, companies must continually update themselves on technology; get maturity in processes and eliminating operational inefficiencies. This requires an involvement of people, processes and the Organization as a whole.

Currently the companies are organizing network format, and business processes among the organizations increasingly use the applications that process and provide information for the operation of this new arrangement. The new organization is a combination of various organizations, composed of interconnected

cells with several access points provided by the infrastructure of information technology (IT), while the central element of processing and storage of information and data in the cloud is the *Datacenter* (VERAS, 2009).

The present work aims to establish a model of integration in networks of alliances with companies applying the theories of physics and cloud computing virtualization to understand the basics of relativity and its application in the communication between companies as strategic business processes and relationships between organizations. The proposal introduces a relativistic and quantum model using the fundamentals of physics. In this context there is the possibility of alliances and resource sharing, to enter into multilateral agreements, involving organizational relationships, interpersonal and inter-organizational.

II. THEORETICAL FRAMEWORK

This section describes the main aspects and justifications for the construction of the system proposed in this paper and are related to: cloud computing, theory of relativity, alliances and corporate networks, propagation of light, optics, time dilation, length contraction, electromagnetic waves, field and magnetic forces, quantum mechanics and virtualization.

2.1. Service design principles

A design paradigm, in the context of business automation is considered the approach that governs the design of logic, which consists of set of rules (or principles) complementary that define collectively the broad approach represented by paradigm. The fundamental unit of service-oriented logic is the *"service"* and in itself represents a distinct design paradigm. Each service gets its own distinct functional context and has a set of capabilities related to this context via public service contract (ERL, 2009).

In this context, the practice and the fundamentals of service contracts allow for greater interoperability, alignment of business and technology domain, greater organizational agility, greater diversification of suppliers, lower workload, low service coupling, service abstraction, and reuse of service and reduced amount of application-specific logic.

2.2. Alliances and networks of enterprises

The role of the Alliance will make the difference in getting the results of the companies involved in the business. Thus it is important to create solid alliances, but well developed, sufficiently flexible to include changes, as the market environment and corporate objectives change and the relationship evolve. The rings can be threatened only if the expected benefits of the relationship growing ever smaller, or if the behavior of any of the parties is deemed to be opportunistic, (FUSCO and SACOMANO, 2009).

In this context, the relationship and the types of relationships should establish the density, the centralization and fragmentation of the network, establishing measures of position of the actors in the network. A network can be coordinated by applying the concepts of network centralization.

A central actor joining several other actors who are not connected with other groups, this central actor then plays the role of coordinating and controlling other actors. This actor can add to the actors don't low density plants offering guidance to perform certain task. In this way the density and centralization indicate how the network (as a whole) is structured. Already fragmentations are disconnected subnets where the actors don't relate to other groups of actors. A high fragmentation means that there exists a strong cohesion, but locally the actors may be strongly cohesive (LAZZARINI, 2008).

2.3. Integration of relativistic model in enterprise networks

Computer networking computing is a set of virtual resources and accessibility of user-friendly *hardware* (physical), *software* (logical), and services development platform. Its resources can be configured easily to fit a workload (*Workload*) variable, allowing the optimization of the use of resources and replace it assets. These features and services are developed using new virtualization technologies, which are: application architectures and service-oriented infrastructure and technologies based on the internet as a means to reduce the resource usage costs of hardware and software you used for processing, storage and networking (ERL, 2009).

2.4. Fundamentals of physics

Physical descriptions of the chapters are based on the fundamentals of light, optics, relativity, electromagnetic waves, quantum mechanics, quantum physics and quantum computing, according to the authors Young and Freedman (2009), Knight, Randall (2009), Ernesto F. Galvão (2007), Herbert a. Pohl (1971) and Michael a. Nielsen and Isaac l. Chuang (2005).

2.4.1. Propagation of light and optics

The first evidence of the wave properties of light occurred around 1665. Only in 1873, James Clerk Maxwell predicted the existence of electromagnetic wave and calculated the speed of its spread, however the

work carried out by Heinrich Hertz (1887) showed that the light is actually an electromagnetic wave. However the wave nature of light to be understood should be linked to the emission and absorption of light so that it is revealed the corpuscular nature of that light. In addition, the energy carried by the light wave is concentrated in discrete packets known as photons or quanta. For the description of the propagation of light using the wave model, but your explanation is accomplished through the issuance and absorption of light (YOUNG and FREEDMAN, 2009).

Electromagnetic sources are accelerated electric charges, thus all bodies emit electromagnetic radiation known as thermal radiation, so any form of matter hot is a light source. The light can also be produced by electrical discharges in ionized gases, therefore light source uses the phosphor material to convert ultraviolet radiation of a mercury arc into visible light. In any light source these electromagnetic waves propagate in a vacuum to the speed of light (c = 2, 99792458 x 10^8 m/s) (YOUNG and FREEDMAN, 2009).

The wave properties of light can be dealt with through the wave optics. In this way are used models of rays of light to study the propagation of light in reflection and refraction. A wave of light when it reaches a smooth surface (split between two transparent media) frequently this wave is partially reflected and refracted. The refractive index of a material (n = c/v) plays a key role in geometrical optics and its propagation is slower through a material than in a vacuum. The letter "c" corresponds to the speed of light in vacuum, while "v" is the speed of light in the material. Therefore the propagation of light through any material has the value of "n" always greater than 1 and in vacuum your value is equal to 1 (YOUNG and FREEDMAN, 2009).

The direction of (A) ray of light varies when it passes from one material to another with different refractive index. Already in relation to frequency "f" (wave characteristics of light) the wave does not vary when this is just a material for another. Figure 1 shows the effects of rays of light.

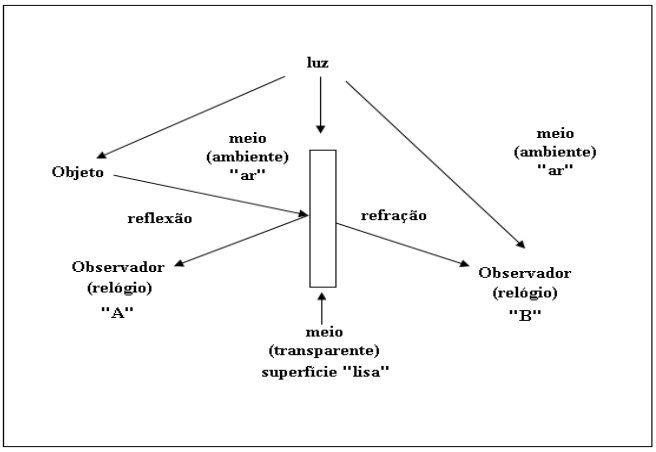

Figure 1-Propagation of light and optics, author.

Figure 1 represents a model that describes the wave properties of light. The main components are the objects, the air, the observers, the light spreads (reflection and refraction) and the light. According to Oliveira (2005), to focus on a surface separating two media with different refractive index, a beam of light is partially reflected and partially refracted. Faced with a smooth surface and a half transparent both the observer and observer B can view the object at the same time when this object receives the light, because according to Einstein's theory of relativity there is not a universal reference system. Considers that the physical phenomena (in same conditions), are identical in all inertial reference systems.

2.4.2. Relativity and light

At the beginning of this century, two theoretical systems that profoundly altered the foundations of classical physics were the theory of quanta, developed by Max Planck (1857-1947) and the history of relativity of Albert Einstein (1879-1955), because these theories together, interpret the universe from the microcosm to the macrocosm of the atom intergalactic spaces (RAMALHO, IVAN, NICHOLAS and TOLEDO, 1976).

Second Ramalho, Ivan, Nicholas and Toledo (1976), aspects and the notion of relativity were proposed by Galileo and Newton in their times ("the physical phenomena are relative to reference systems"). Space and time appear to be simple concepts as it is possible to measure distances by means of a ruler or a train. With a timer it is possible to record the time of occurrence of events. Einstein's theory already altered our understanding of some fundamental concepts of physics. Has real consequences for modern technology and understanding of the universe we live in (KNIGHT, 2009).

Einstein's theory of relativity the consequence there is a universal reference system. In their postulate of the theory of special relativity relates that "the laws of physics are identical in reference systems, in rectilinear

motion and uniform, some in relation to others". This postulate is of the opinion that the physical phenomena (in same conditions), are identical in all inertial reference systems, because there is no universal reference system. Therefore we do not know of the existence of any experience able to determine if a system is at rest or uniform rectilinear and moves against an arbitrary reference inertial system (RAMALHO, IVAN, NICHOLAS and TOLEDO, 1976). To Einstein: a) the speed of light is a universal constant, b) is the same in all inertial reference systems, c) in a vacuum does not depend on the motion of the light source and has equal value in all directions.

As Young and Freedman (2009), the theory of relativity has introduced significant changes, since it states that the laws of physics should be the same in any inertial reference system. Since the speed of light in vacuum should always be the same in any system of reference. The main consequences of these statements are:

a- An event that occurs simultaneously to another relative to an observer may not occur simultaneously in relation to another observer.
b- When there is relative motion between two observers and they effect measures of time and distance intervals, the results obtained may agree.
c- So that the law of conservation of energy and the law of conservation of linear momentum are valid in any inertial reference system, Newton's second law and the equations for the kinetic energy and momentum must be reworded.

It is known that the Faraday induction law is compatible with the principle of relativity, because all the laws of electromagnetism are the same in all inertial reference systems. Another important fact that must be cited is also the prediction of propagation velocity of electromagnetic waves in a vacuum, which were deducted from the Maxwell equations stating that light and all electromagnetic waves travel in a vacuum with a constant speed of 299,792,458 m/s (c = 3.0 x 108 m/s) which is the speed of light. According to Einstein's postulate, the speed of light in vacuum is always the same in any inertial reference system and does not depend on the speed of the source (YOUNG and FREEDMAN, 2009). According to Einstein's postulate, the movement of the light after that abandons the font cannot depend on the motion of the source, because an inertial observer cannot move with the speed of light.

On the relativity of simultaneity, it is known that the measure of the time and a time interval involves the concept of simultaneity. Concurrency is not an absolute concept, because if two events occur simultaneously or not, that depends on the reference system. Concurrency plays an important role in the measurement of time intervals. Thus we conclude that intervals of time between two events may be different in different reference systems, can also time dilation occurs. The distance between two points also depends on the reference system (not just the time interval between two events) and where is the observer. Can occur what we call length contraction, the relative velocity does not suffer contraction. There is no length contraction when two rules are arranged in directions perpendicular to the direction of relative velocity (YOUNG and FREEDMAN, 2009). The fundamental principal of relativity is named event. An event is an occurrence in a physical space set point and in a second set of time. Events can be observed and measured by observers who use different benchmarks, because an event is what actually happens. Concurrency is determined already inquiring when the event actually occurred, and not when it was seen or observed (KNIGHT, 2009).

According to the principle of relativity, all laws of physics are the same in any inertial frame of reference. All observers not matter how each move in relation to the other, realize that all the light waves (regardless of its sources) spread in relation to their respective benchmarks with the same speed of light ($c = 3 \times 10^8$ m/s). Any experiment conducted to compare the value of the speed of light in relation to different benchmarks reveals that propagates with the same speed of light in any inertial frame, is independent of how the frames move towards others (KNIGHT, 2009).

The special theory of relativity of Einstein (1905) is based on two assumptions: there is a reference to determine whether a body is in absolutely rest and the speed of light is independent of the speed of its source. This theory of special relativity Einstein invented the theory of general relativity, which describes gravity as geometrical property of space and time (GAZINELLI, 2013).

According to Knight (2009), Einstein's theory of relativity forced a review of the concepts of space and time, because the experiments revealed that the classical distinction between particles and waves there at atomic level. Already, it is known that light behaves as a particle, while the electrons (or entire atoms) behave as waves. While in theory of quantum physics (early 1920) Atomic particles are described as wave function.

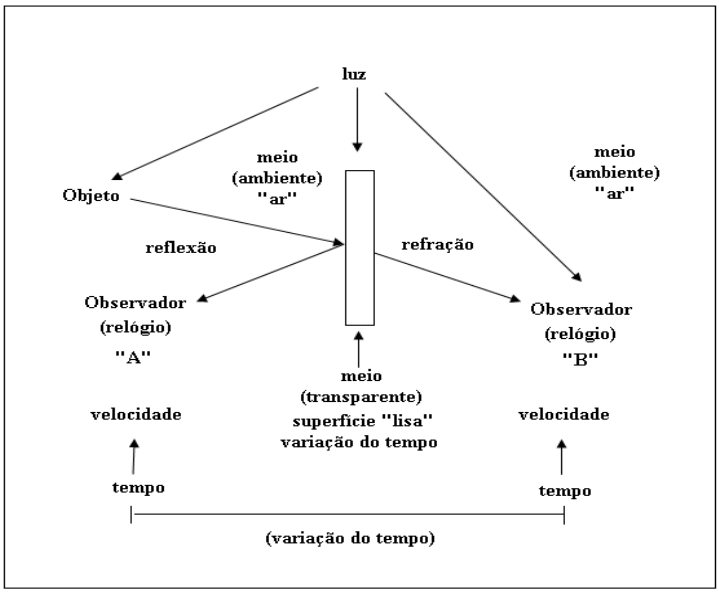

Figure 2-Relativity of simultaneity and time, author.

Figure 2 shows the light on the object according to the vision of observers A and B (standing) at the same time the incidence of light on a transparent medium. Time variation is established in relation to the observers, the reflection and refraction of light on the object and the trajectory of the light in relation to the smooth surface. It is observed that the light cannot depend on the motion of the source, because an inertial observer cannot move with the speed of light, the principle of relativity of simultaneity.

2.4.2.1. Time dilation and length contraction

The length $L = x_2 - x_1$ bar, measured in the frame R, is less than the length $L' = x'_2 - x'_1$ the same bar, measured in the frame R ´, excited about μ speed R, is called length contraction (RAMALHO, IVAN, NICHOLAS and TOLEDO, 1976).

The principle of relativity leads to the conclusion that the time is not the same for the two reference frames that move one to the other. A temporal dilation can be defined as $\Delta t=\Delta r/\sqrt{1-\beta^2} \geq \tau$. the main aspect of relativity is that all are equally valid and inertial everything we know about the referential is as they move towards others (KNIGHT, 2009). The concept of time dilation is used whenever they are compared the intervals between events compared to observers in different inertial reference systems. For a non-inertial reference system with high speed time is longer compared to inertial reference time is shorter (YOUNG and FREEDMAN, 2009).

In addition to the time interval, the distance between two events depends also on the reference system, where the observer is (also involves the concept of simultaneity). The length measured in the reference system in which the body is at rest is the length itself, already the length measured in any other reference system that moves is the length contraction (YOUNG and FREEDMAN, 2009). Shortening the distance between two objects, as measured by an observer moving relative to the objects is called the spatial contraction. The length of the object is maxim with respect to the reference in that the object is at rest. The length of the object is smaller when measured relative to any frame in which the object is in motion (KNIGHT, 2009).

2.4.3. Electromagnetic waves

Maxwell and Hertz and other established that light is an electromagnetic wave, interference, diffraction and polarization provide evidence of the wave nature of light. When observed closely the emission, absorption and scattering of electromagnetic radiation have completely different aspects of light, because the energy of a quantized electromagnetic wave. The light is emitted and absorbed in packets with defined energies, known as photons or quanta, and the energy of a single photon is proportional to the frequency of the radiation. The energy of an atom is also quantized, because its internal power cannot assume any value, only some values of energy known as energy levels (YOUNG and FREEDMAN, 2009). According to Pohl (1971), the unit of energy quanta was the first to introduce the concept of a quantum of energy, because it found that the energy was transferred into units or packages (called quanta) that became more evident by the photoelectric effect, played by Einstein.

Electromagnetic waves arise as a result of two effects: a variable magnetic field produces an electric field and a variable electric field produces a magnetic field. In this way these two fields constantly add in its

spread through space. As Maxwell, if at a point P is produced a variable electric field $\vec{E}$ so will induce a magnetic field variable $\vec{B}$ with time and with distance from point P. Furthermore, the vector $\vec{B}$ will induce a variable vector $\vec{E}$, which also varies with time and with distance from the variable magnetic field. This reciprocal induction magnetic and electrical fields, variables with the time and distance, it becomes possible to spread this induction sequence through space. Therefore, an electrical disturbance in the point P, due to oscillation of electrical charges, these travel to distant points through the mutual formation of electrical and magnetic fields variables (RAMALHO, IVAN, NICHOLAS and TOLEDO, 1976). The demonstration of the speed of propagation of an electromagnetic wave in vacuum, according to Maxwell is equal to the speed of light in vacuum (where v = 3 x 10^8 m/s), where v is the speed of propagation of an electromagnetic wave in vacuum.

On the airwaves, it is known that in frequency between 10^4 to 10^7 Hz, are very well reflected by the ionized layers of the upper atmosphere (known as the ionosphere). This reflection allows radio waves to be detected at large distances from the network, because it has a wavelength of tens to thousands of meters and useful for transmission of information. These waves can be transmitted from one continent to another by means of artificial satellites (RAMALHO, IVAN, NICHOLAS and TOLEDO, 1976).

2.4.4. Field and magnetic forces

The classical physics was formed for mechanics, electromagnetism and thermodynamics. The phenomena of electricity and magnetism were studied experimentally and its fundamental laws were discovered. Later, James Clark Mawell, Hans Christian Oesrsted and Michael Faraday, were able to gather in a single theory the phenomena of electricity, introducing the concept of electromagnetic field. The magnetic field continuously occupies a region of space that is characterized by two vector quantities (electric and magnetic fields). The speed of propagation of electromagnetic waves in vacuum is identical to the speed of light and it is concluded that the light is a kind of electromagnetic wave. They thus unify into a single optical phenomena and theory of electromagnetism. Then the thermodynamics completes the picture of classical physics, because it deals with the concepts of energy, temperature and heat. The theory of unification continued with Maxwell's electromagnetic theory, which United electrical, magnetic and optical phenomena (GAZZINELLI, 2013).

As Young and Freedman (2004), a magnetic interaction can be described as: a) a live load or an electric current creates a magnetic field in their neighborhoods (in addition to the electric field), b) the magnetic field exerts a force about any other current or load that moves within the field. The magnetic field is a vector field associated with each point in space.

Magnetic forces only act on moving charges and it turns out that the electrical and magnetic interactions are related. However the magnetic force depends on the speed of the particle, unlike electric force which is always the same is independent of charge be at rest or in motion. An electric charge in motion does not suffer from magnetic forces action, but creates a magnetic field when you're on the move, already the symmetry properties of the magnetic field can be related to ampere's law. That same electric field can also vary with time (known as displacement current) to produce a magnetic field (YOUNG and FREEDMAN, 2004).

Regarding the photo-electric effect it is known that an electromagnetic radiation, focuses on a surface of a metal, electrons can be expelled this surface and this phenomenon (discovered by Hertz in 1887), is called Photo-electric effect, which was explained later by Einstein in 1905. Einstein proposed that the photo-electric effect, one photon of radiation incident, when a metal is completely absorbed by a single electron, yielding your energy instantly, so the electron of metal with an additional power. Einstein suggests, so that the light is composed of photons and that this can be absorbed by the metal just one at a time, and there is no fractions of a photon. For Einstein "the energy of the electron must increase with the frequency and has nothing to do with the intensity of the radiation. However the energy received by an electron, by absorbing a photon is always the same (RAMALHO, IVAN, NICHOLAS and TOLEDO 1976).

2.4.5. Quantum mechanics

The quantum nature of light is used to explain properly the photo-electric effect is in contradiction with the wave nature of light, however allows you to justify the interference and diffraction phenomena of light. Despite that the two theories are completely different are also needed to explain a single physical phenomenon. To reconcile these facts was presented the "dual" nature of light, where in certain phenomena the light behaves as a wave nature and in other, particle nature. The same beams of light can deflator around an obstacle and focus on the surface of the metal, causing the photo-electron emission. To Louis De Broglie (1924), if the light has dual nature, also a particle could behave similarly, and then relates the wave characteristic with particle size. With it your chance other physicists have developed quantum mechanics who favored the exact description of Atomic phenomena, because it changed the way of looking at nature in terms of probability terms and not in terms of certainty (RAMALHO, IVAN, NICHOLAS and TOLEDO, 1976).

As Max Planck (1900), an electron oscillating with frequency "f", emit (or absorb) an electromagnetic wave of the same frequency, but energy is not emitted (or absorbed) continuously, and in discontinuous servings (particles that carry each a number of well-defined energy) called photons. The energy of each photon is called a quantum or quanta (in the plural). An oscillating electron cannot absorb (or issue) energy continuously (or an electron absorbs (or send) a quantum or anything).

In 1982 Richard Feynman published a work in which he argued the simulation of particles that behave according to quantum mechanics. He had observed that even simple problems of quantum physics seem to require an immense number of computational steps in its resolution seemed to be in the category of intractable problems. For him the quantum properties of the simpler system would help in more complex systems simulation, thus a quantum computer could be more efficient than a usual computer, the question is: "what kind of problem could be solved more quickly in a quantum computer than a classical computer?" (GALVÃO, 2007).

Today we know that the main problems that can be solved by quantum computers are the simulation of quantum systems proposed by Feynman (simulation of new devices and materials), factoring and search in a database. In 1984, Charles Bennett and Gilles Brassard developed the first absolute security protocol, which involves the exchange of quantum particles of light (photons), assuming only the quantum mechanics is an accurate description of nature. One of the main advantages has its origins in the phenomena of superposition and entanglement (GALVÃO, 2007).

2.5. Integration of relativistic computing and virtualization

The choice of measurement of properties chosen for the actors are "subject" that have two possible values (business or social) and "duration" which also have only two values (long and short). So, measuring these properties can determine the existing correlations of these results. The application of quantum mechanics, establish the superposition States of the objects (actors) and their behaviors (some aspects) as if they were in multiple positions at the same time, because in this state it is possible to be manipulated and measured. When measuring the properties "subject" and "duration" of the companies involved after the connection, it is possible to obtain by analogy the importance and the possible values that will determine the correlations of these properties.

With the application of relativity of simultaneity seeks to establish a measurement and time interval in the interaction between the actors of a company network in relation to systems of references and events. Through the theory of relativity applies the concept of space and time of cloud computing (virtualization), in addition to the exchange of services between the actors of a communication network with the use of the internet. The fundamentals applied in the construction of the proposed model will serve as the basis for the construction of the graphical interface of the classic model (space, time, speed) Newtonian and relativistic model (space, time, speed) of Einstein. Already the foundations of physics, structure the foundations for the construction of quantum computation.

III. METHODOLOGY AND MATERIALS

This research work is classified as applied, are proposing a model based on data collection and aims to generate possible knowledge of practical application to resolve specific problems of connection between corporate networks and cloud computing virtualization.

As for the approach, this research is quantitative, as it seeks to explain through quantifiable data, show relationships of phenomena observed with proof (or not) of the hypothesis established, delineated on the collection of data to prove systematically confirmation (or not) of this hypothesis. This work is an exploratory research, because of the importance of this study, aims to enhance the application of network model in companies with cloud computing virtualization, using the fundamentals of Physics in a relativistic view.

The surveys conducted have provided a better understanding of the matter proposed in this work and offered a clearer vision of the problem and of ideas. The research also involved bibliographic survey, interviews with other teachers in the areas of physics and computer science who had practical experience problems searched for a greater understanding and dimension of this study. In this context it was possible to better clarify about the subject, to then propose the model proposed. Technical procedures were already structured in: characterization of the study, data collection, data analysis, application of physics, simulation of the values and presentation (charts and graphs). We used the concepts of physics laws of reflection and refraction, reflection and the Huygens principle, interference of light, diffraction, wave-particle duality, electromagnetic phenomena, Galileo and Einstein relativity, simultaneity, time dilation, spatial contraction, mechanics and quantum physics. In addition, were supplemented with the fundamentals of corporate networks and cloud computing.

To obtain the data collected was used in a sample table with the following structure: date, time, machine, OS, connection time, processing speed, RAM, period, wavelength, connection speed, distance and frequency. Through this infrastructure was able to access and perform measurements of the environment offered by internet and cloud computing virtualization for verification of connections in distributed environment and

cloud computing virtualization. Then were formulated mathematical and physical expressions, generated from the data entries which resulted in the data presented in tables and charts. It was elaborated the relativistic model architecture of network of companies and of application of virtualization of computers based on the frequency of wave. As a constraint to the model presented adopted the magnetic wave velocity (speed of light), as a means of propagation for the connection between the actors of a network of companies in virtualization of *Datacenters*.

3.1. Scope of the experimental work

Models will be developed on the basis of the results generated by connections of computers in internet networks and cloud computing virtualization to deepen the knowledge and behavior of the virtual machines. Will be monitored and compared with the basics presented by Relativistic Physics. Then mathematical arguments will be constructed to validate the applications of Physics in computer network environment, using the registered virtual stopwatch. For the study and analysis of the results presented will use as a basis the mechanics and quantum physics for the deepening of quality of information. Through simulations and tests will be established the limits of Royal connections and relativist and show the results achieved and also the differences established by connections registered by machines available (beginning of tunneling between the network nodes).

3.2. Project Architecture

The relativity is space and time. The difficulty is that some aspects of relativity seem to be incompatible with the laws of electromagnetism, especially the laws that govern the propagation of light waves. Special relativity Einstein involves spatial contraction and time dilation (KNIGHT, 2009). Based on these strong foundations established the structure of architecture and the proposal of this work.

As Knight (2009) it is known that no object has a "true" speed, because its speed towards someone is moving or stopped. The most that is possible is the specification of the speed of an object relative to a coordinate system. However the definition of reference can be based on: the referential) extends infinitely in all directions, b) are observers at rest relative to its benchmark, c) the number of observers and the amount of equipment used is enough to measure the positions and the velocities with any level of accuracy established.

In the proposed architecture in this work, it is considered that all components (objects) belong to a single inertial frame, where all observers are at rest, in relation to the other and belong to the same benchmark.

The principle of Galilean relativity "the laws of mechanics are the same in all inertial reference frames". To the principles of relativity, all laws of physics are the same in any inertial frame (all results of the theory of relativity based on this postulate). And whereas Maxwell's equations of electromagnetism which are laws of physics, they are also true in any inertial frame and predict that electromagnetic waves (including light) propagate with the speed $c = 3.00 \times 10^8$ m/s, so the light propagates with the speed "c" in all inertial reference frames (KNIGHT, 2009).

According to the experiments performed in the laboratory to compare the value of the speed of light in relation to different benchmarks, reveal that light propagates with 3.00 x 108 m/s for any inertial, regardless of how the frames move towards others (KNIGHT, 2009). In this way the architecture (proposed), considers how inertial frame the principle of relativity to the components: actors, *Datacenter*s and quantum computations.

For the fundamental entity of relativity physics is the event (occurrence physics in a point set space and in a second set of time), which can be observed and measured by observers who use different benchmarks. It is also possible to quantify where and when an event occurs using coordinates (x, y, z) and the instant of time "t" which are known as space-time coordinates of the event, because an event is what actually happens. However when two events occur in different positions, but at the same time measured in some benchmark are known as simultaneous. Concurrency is determined inquiring when the event actually occurred, and not when it was seen or observed (KNIGHT, 2009). The observation of events of architecture proposal on simultaneity between the components (objects) located in layers (A), (B) and (C) because "t" is the second time in the event (communication) actually occurs between the components (objects) of architecture (considering the fact that light propagates the 300×10^8 m/s events occur simultaneously).

Physical studies reveal that the light travels equal distances in equal time intervals, because the light propagates at a speed "c" in relation to all the references independent of the motion of objects. According to the theory of relativity "two events that occur simultaneously in a referential S are not simultaneous in another frame S ´ in relative motion to S" (known as relativity of simultaneity). Therefore the proposed architecture is based on the propagation of light in all reference frames and all components (objects) represented by the layers (A), (B) and (C), in addition, it is considered just a benchmark as qualitative measurement. As Knight (2009), the principle of relativity concludes that the time is not the same for the two reference frames that move a in relation to the other, since the space is different from moving a referential in relation to another.

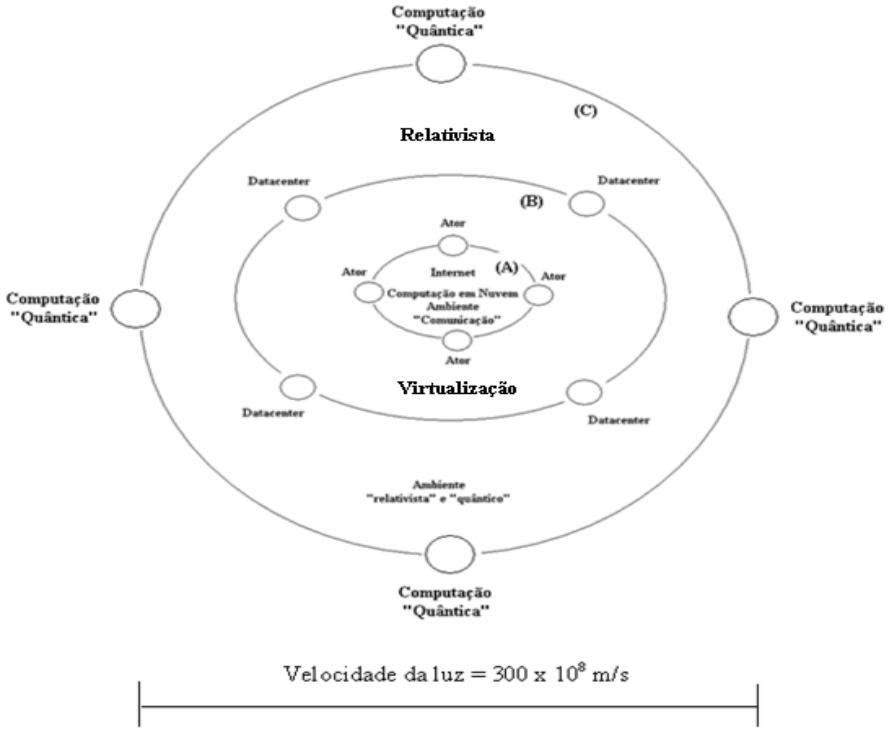

Figure3-relativistic model architecture business networks, author.

Figure 3 above shows how inertial reference the light for the connection between the components (objects) arranged in layers A, B and c. in the layer are the major features of the internet, cloud computing and communication protocols. B layer the components and features of virtualization provided by *Datacenters*, already in the C layer quantum computing resources (a new technology necessary for the application of the relativistic model).

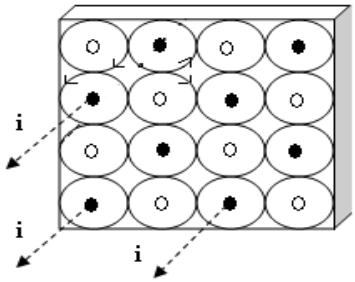

Figure 4 – array of circular motion of magnetic field and electric current, author.

Figure 4 above represents an array where the coils are located where they are traversed chains or not, in each one of these coils to generate electromagnetic fields. In addition, it also shows the meanings of the fields (clockwise or anti-clockwise) when currents are applied in their coils. When circulating current in a coil electromagnetic fields of their neighborhoods may be clockwise or counter-clockwise, because it depends on the intensity of the current that runs through each of their specific coils. The result of these movements are the records that identify the frequencies waves, which quantifies its corresponding value (can be considered the principle of quantum memory) of stored information and also possible to be recovered (through the specific frequencies).

The superposition is a technical term that describes one of the main features of microscopic objects that follow the rules of quantum mechanics. The quantum superposition is the possibility of a quantum object takes a peculiar combination of properties that would be mutually exclusive in accordance with our intuition. Quantum mechanics allows making predictions in terms of probabilities which can be described through the probability amplitudes. Can be manipulated and measured which usually alter the probability amplitudes associated with each position, because it depends on the probability amplitudes immediately before the measurement (GALVÃO, 2007).

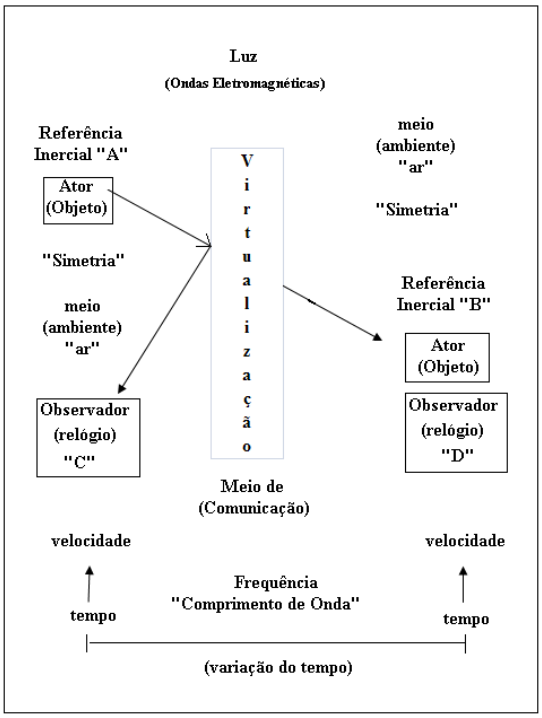

Figure 5 – relativistic Model and application of virtualization to cloud computing, author.

Based on the foundations of quantum mechanics in Figure 5 above, shows the superposition of the propagation speed of the media in relation to speed and time and the application of the frequency and wavelength. The transmission of the communication established between companies can be measured through its properties. Such properties can be the "subject" (social or business) or the "duration" (short or long) in the exchange of information between them, thus characterized the superposition that occurs on virtualization offered by quantum computation. Under these conditions the relativistic space and time are applied to connection speed or tunneling in relation to the speed of light.

One of the key concepts in relativity is the concurrency, and is associated with the relativity of time (OLIVEIRA, 2005). An exchange of information between the actor (or company) "A" frame with the frame "C" Observer are simultaneous events when they occur at the same time. For a connection speed with very high speeds (according to Einstein's theory of relativity) time under these conditions can dilate (known as time dilation), your route will be larger and thus the observer "C" will take longer to receive the connection and the information sent. The actor already inertial reference "D" will receive the connection before both of which (A and D Company) are running within the virtualization environment.

Light is an electromagnetic wave and its energy transported by the light wave is concentrated in discrete packets known as photons or quanta. Aspects of health and corpuscular of light apparently contradictory are explained were reconciled with the development of quantum electrodynamics (YOUNG and FREEDMAN, 2009). As Galvão (2009), distant quantum particles seem to be communicating, so that the measures of its properties are correlated. Figure 6 shows the correlation between the actors (or businesses) on a communication, exchange of information or services. These correlations are the measurements of the properties of the actors (or companies) that are: "subject" who own the business or social values and "duration" that have the values, long or short. These measures allow to quantify the correlations that exist between companies, which are monitored by the layer of cloud computing and virtualization are also represented by tables 1 and 6 figures below. The light has an undulating phenomenon (according to Maxwell electrodynamics) for this reason will always be an electromagnetic wave in any inertial frame (travel with the same speed of light, $c = 3 \times 10^8$ m/s), thus it can be concluded that the speed of propagation of the communication and exchange of messages between the companies has the same value in all inertial systems (maintains the integrity the sending and receiving such information)provided that use light waves on the connection between companies (principle of implementation of quantum computation).

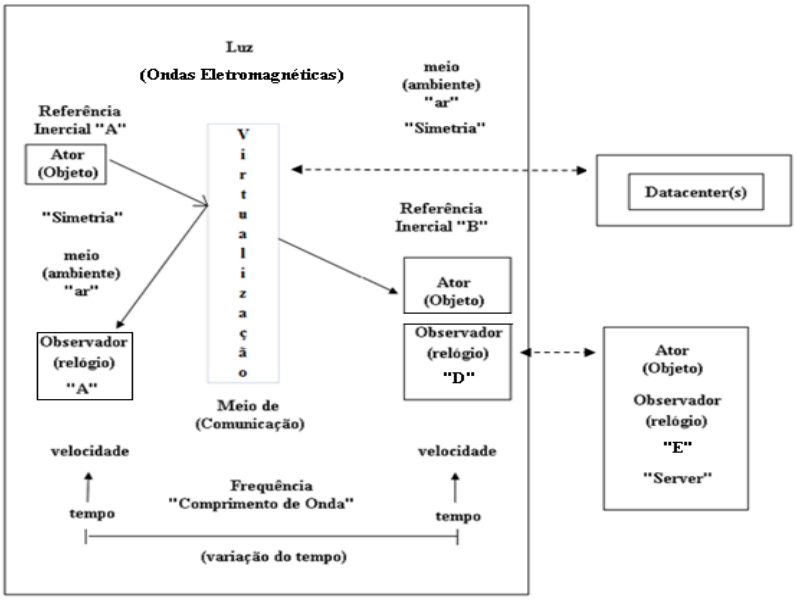

Figure 6 – Relativistic Model and the application of the wave frequency and virtualization in cloud computing, author.

Figure 6 shows the behavior of light and its undulating phenomenon (according to electrodynamics of Maxwell), for this reason will always be an electromagnetic wave in any inertial frame (travel with the same speed of light, $c = 3 \times 10^8$ m/s), thus it can be concluded that the speed of propagation of the communication and exchange of messages between the companies has the same value in all inertial systems (maintains the integrity and shipping receipt of this information), since that uses light waves on the connection between companies (principle of implementation of quantum computation). Established (first) the connection (using electromagnetic connections), to carry out the exchange of information, so the data can be packaged and transmitted by electromagnetic field (using the C layer of architecture proposal).

3.3. Details of the components

Will be developed an infrastructure model to test, simulating the connections with the virtualization tunneling with the *Datacenters* and using different computer speeds and models. In this way these components will extend the communication resources of educational institutions that are connected on the network to facilitate transactions and exchanges of services between these institutions.

In this project the main components are: the *Datacenters*, the doors of communication between the structures of clouds Computing Virtualization, networking organizations, service models, electromagnetism and the foundations of relativity.

3.4. Tools used

The main tools used are: the hosting cloud computing, *web* technologies, the models of enterprise network services, and the application of electromagnetism in communications transmissions.

3.5. Application environments

The environment for realization will be built using internet networks, cloud computing, virtualization, *Datacenters* and networks of educational institution as intra-organizational type. The infrastructure for the implementation of the case study should be built using computers of different sizes and characteristics, where they will be interconnected in a network of computers using virtualization of these machines. Aiming at the application and realization of this work is its implementation with the cloud computing and basics of relativity to be able to demonstrate its advantages.

4. Analysis of results

The tables below show the results of the data collected for the analysis of the implementation of the modifications of the Galilean relativity, time contraction, time dilation and the relativistic momentum.

1	Data	Hora	Máqui	Sistema Operacional	Tempo UOL	Velocidade	Memória RAM
70	21/1/2014	09h14	A	XP	8,56	2,67	3,00
71	21/1/2014	09h14	A	XP	2,31	2,67	3,00
72	21/1/2014	09h14	A	XP	2,72	2,67	3,00
73	21/1/2014	09h14	A	XP	3,00	2,67	3,00
78	21/1/2014	15h02	A	XP	9,21	2,67	3,00
79	21/1/2014	15h02	A	XP	2,84	2,67	3,00
80	21/1/2014	15h02	A	XP	2,91	2,67	3,00
81	21/1/2014	15h02	A	XP	3,13	2,67	3,00
86	22/1/2014	09h10	A	XP	24,32	2,67	3,00
87	22/1/2014	09h10	A	XP	3,88	2,67	3,00
88	22/1/2014	09h10	A	XP	2,84	2,67	3,00
89	22/1/2014	09h10	A	XP	2,84	2,67	3,00
94	22/1/2014	13h26	A	XP	31,91	2,67	3,00
95	22/1/2014	13h26	A	XP	3,13	2,67	3,00
96	22/1/2014	13h26	A	XP	2,82	2,67	3,00
97	22/1/2014	13h26	A	XP	2,97	2,67	3,00
106	23/1/2014	08h00	A	XP	9,06	2,67	3,00
107	23/1/2014	08h00	A	XP	2,79	2,67	3,00
108	23/1/2014	08h00	A	XP	3,09	2,67	3,00
109	23/1/2014	08h00	A	XP	2,84	2,67	3,00
114	23/1/2014	14h48	A	XP	30,25	2,67	3,00
115	23/1/2014	14h48	A	XP	3,25	2,67	3,00
116	23/1/2014	14h48	A	XP	2,93	2,67	3,00
117	23/1/2014	14h48	A	XP	2,75	2,67	3,00
123			A	XP	6,29	2,67	3,00

Table 1-Data collection of server and client environment computing, author.

Table 1 shows the results applied in a computer PC (*Personal Computer*) Intel processor speed of 2.67 GHZ, XP operating system (from *Microsoft*) with the amount of 3.00 GB RAM, where they were recorded: the dates, times and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main features of the machine used in the environment (client/server) on the internet and how tunneling was carried out of the connection with the *Datacenter*.

1	Data	Hora	Máqui	Sistema Operacional	Tempo UOL	Velocidade	Memória RAM
6	18/1/2014	11h45	B	XP	13,09	1,73	2,00
7	18/1/2014	11h45	B	XP	9,90	1,73	2,00
8	18/1/2014	11h45	B	XP	12,72	1,73	2,00
9	18/1/2014	11h45	B	XP	9,78	1,73	2,00
14	18/1/2014	11h59	B	XP	14,90	1,73	2,00
15	18/1/2014	11h59	B	XP	9,87	1,73	2,00
16	18/1/2014	11h59	B	XP	9,85	1,73	2,00
17	18/1/2014	11h59	B	XP	12,88	1,73	2,00
22	18/1/2014	22h20	B	XP	12,91	1,73	2,00
23	18/1/2014	22h20	B	XP	9,72	1,73	2,00
24	18/1/2014	22h20	B	XP	14,79	1,73	2,00
25	18/1/2014	22h20	B	XP	12,81	1,73	2,00
30	19/1/2014	16h13	B	XP	28,19	1,73	2,00
31	19/1/2014	16h13	B	XP	9,81	1,73	2,00
32	19/1/2014	16h13	B	XP	12,69	1,73	2,00
33	19/1/2014	16h13	B	XP	10,75	1,73	2,00
38	19/1/2014	18h15	B	XP	18,28	1,73	2,00
39	19/1/2014	18h15	B	XP	9,81	1,73	2,00
40	19/1/2014	18h15	B	XP	12,97	1,73	2,00
41	19/1/2014	18h15	B	XP	9,94	1,73	2,00
124			B	XP	12,78	1,73	2,00

Table 2-Data collection of server client environment computing, author.

Table 2 shows the results applied in a computer *Notebook* Intel processor 1.73 GHZ speed, operating system XP (from *Microsoft*) with the amount of 3.00 GB RAM, where they were recorded: the dates, times and the time required connecting to a site (UOL). At the end of the table is recorded the average time for the connections and the main features of the machine used in the environment (client/server) on the internet and how tunneling was carried out of the connection with the *Datacenter*.

1	Data	Hora	Máqui	Sistema Operacional	Tempo UOL	Velocidade	Memória RAM
61	20/1/2014	14h42	C	Windows 7	0,90	2,50	6,00
66	20/1/2014	20h42	C	Windows 7	35,56	2,50	6,00
67	20/1/2014	20h42	C	Windows 7	0,78	2,50	6,00
68	20/1/2014	20h42	C	Windows 7	1,25	2,50	6,00
69	20/1/2014	20h42	C	Windows 7	1,88	2,50	6,00
74	21/1/2014	09h16	C	Windows 7	5,69	2,50	6,00
75	21/1/2014	09h16	C	Windows 7	0,97	2,50	6,00
76	21/1/2014	09h16	C	Windows 7	0,68	2,50	6,00
77	21/1/2014	09h16	C	Windows 7	0,81	2,50	6,00
82	21/1/2014	15h03	C	Windows 7	5,44	2,50	6,00
83	21/1/2014	15h03	C	Windows 7	1,00	2,50	6,00
84	21/1/2014	15h03	C	Windows 7	0,97	2,50	6,00
85	21/1/2014	15h03	C	Windows 7	0,56	2,50	6,00
90	22/1/2014	09h12	C	Windows 7	5,84	2,50	6,00
91	22/1/2014	09h12	C	Windows 7	0,88	2,50	6,00
92	22/1/2014	09h12	C	Windows 7	0,85	2,50	6,00
93	22/1/2014	09h12	C	Windows 7	0,75	2,50	6,00
98	22/1/2014	13h28	C	Windows 7	6,32	2,50	6,00
99	22/1/2014	13h28	C	Windows 7	1,00	2,50	6,00
100	22/1/2014	13h28	C	Windows 7	1,06	2,50	6,00
101	22/1/2014	13h28	C	Windows 7	0,78	2,50	6,00
125			C	Windows 7	3,05	2,50	6,00

Table 3 — Data collection of server client environment computing, author.

Table 3 shows the results applied in a computer *Notebook* Intel processor 2.50 GHZ speed, operating system Windows 7 (from *Microsoft*) with the amount of 6.00 GB RAM, where they were recorded: the dates, times and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main features of the machine used in the environment (client/server) on the internet and how tunneling was carried out of the connection with the *Datacenter*.

1	Data	Hora	Máqui	Sistema Operacional	Tempo UOL	Velocidade	Memória RAM
102	22/1/2014	13h39	D	Windows 7	6,69	1,20	2,00
103	22/1/2014	13h39	D	Windows 7	7,81	1,20	2,00
104	22/1/2014	13h39	D	Windows 7	8,72	1,20	2,00
105	22/1/2014	13h39	D	Windows 7	5,00	1,20	2,00
110	23/1/2014	08h02	D	Windows 7	8,00	1,20	2,00
111	23/1/2014	08h02	D	Windows 7	10,73	1,20	2,00
112	23/1/2014	08h02	D	Windows 7	11,63	1,20	2,00
113	23/1/2014	08h02	D	Windows 7	8,41	1,20	2,00
118	23/1/2014	14h53	D	Windows 7	8,84	1,20	2,00
119	23/1/2014	14h53	D	Windows 7	3,38	1,20	2,00
120	23/1/2014	14h53	D	Windows 7	6,97	1,20	2,00
121	23/1/2014	14h53	D	Windows 7	12,50	1,20	2,00
126			D	Windows 7	8,22	1,20	2,00

Table 4 — Data collection of server client environment computing, author.

Table 4 shows the results applied in a computer *Notebook* Intel processor 1.20 GHZ speed, operating system Windows 7 (from *Microsoft*) with the amount of 2.00 GB RAM, where they were recorded: the dates, times and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main features of the machine used in the environment (client/server) on the internet and how tunneling was carried out of the connection with the *Datacenter*.

	E	F	G	H	I	J	K	L	M	N
1	Tempo UOL	Velocidade(GHZ)	Memória RAM(GB)	T(Periodo) seg	Comprimento de onda(cm)	Velocidade Conexão(cm/s)	Comprimento de onda(cm)	Distância(cm)	Tempo(seg)	Freqüência (GHZ)
110	8,00	1,20	2,00	0,000000000833	25,00	0,0313	0,000000000026	0,25	8,00	1,2
111	10,73	1,20	2,00	0,000000000833	25,00	0,0233	0,000000000019	0,25	10,73	1,2
112	11,63	1,20	2,00	0,000000000833	25,00	0,0215	0,000000000018	0,25	11,63	1,2
113	8,41	1,20	2,00	0,000000000833	25,00	0,0297	0,000000000025	0,25	8,41	1,2
114	30,25	2,67	3,00	0,000000000375	11,24	0,0037	0,000000000001	0,11	30,25	2,67
115	3,25	2,67	3,00	0,000000000375	11,24	0,0346	0,000000000013	0,11	3,25	2,67
116	2,93	2,67	3,00	0,000000000375	11,24	0,0383	0,000000000014	0,11	2,93	2,67
117	2,75	2,67	3,00	0,000000000375	11,24	0,0409	0,000000000015	0,11	2,75	2,67
118	8,84	1,20	2,00	0,000000000833	25,00	0,0283	0,000000000024	0,25	8,84	1,2
119	3,38	1,20	2,00	0,000000000833	25,00	0,0740	0,000000000062	0,25	3,38	1,2
120	6,97	1,20	2,00	0,000000000833	25,00	0,0359	0,000000000030	0,25	6,97	1,2
121	12,50	1,20	2,00	0,000000000833	25,00	0,0200	0,000000000017	0,25	12,50	1,2
122	Tempo UOL	Velocidade	Memória RAM	T(Periodo) seg	Comprimento de onda(cm)	Velocidade Conexão(cm/s)	Comprimento de onda(cm)	Distância(cm)	Tempo(seg)	Freqüência (GHZ)
123	13,93	2,67	3,00	0,000000000988	29,64	0,1081	0,000000000047	0,30	13,93	
124	38,50	1,73	2,00	0,000000002692	80,75	0,2938	0,000000000127	0,81	38,50	
125	14,39	2,50	6,00	0,000000001134	34,02	0,1563	0,000000000067	0,34	14,39	
126	12,97	1,20	2,00	0,000000001083	32,49	0,0548	0,000000000036	0,32	12,97	
127										
128						Veloc. Relat.		Dist. Relat.	Tempo Relat.	
129						0,108129243		0,296434695	13,931607143	
130						0,293844001		0,807545236	38,504000000	
131						0,156295539		0,340154494	14,392500000	
132						0,054835504		0,324906367	12,970000000	
133										
134						Variação Veloc. Relat.		Variação	Variação	
135						0,000029243		0,003565305	0,001607143	
136						0,000044001		0,002454764	0,004000000	
137						0,000004461		0,000154494	0,002500000	
138						0,000035504		0,004906367	0,000000000	

Table 5 – Time dilation and contraction of space, author.

Table 5 shows the results presented in the analysis of the connections established by physical machines of different characteristics, applying the concepts of virtualization, calculations of tunneling: period, wavelength, frequency, time and distance and time variations relativists. Table 6 shows the more detailed results and explains the time dilation and contraction of space in virtualization environment.

	0,0740	0,000000000062			
	0,0359	0,000000000030	0,25	6,97	
	0,0200	0,000000000017	0,25	12,50	
cm)	Velocidade Conexão(cm/s)	Comprimento de onda(cm)	Distância(cm)	Tempo(seg)	Fr
	0,1081	0,000000000047	0,30	13,93	
	0,2938	0,000000000127	0,81	38,50	
	0,1563	0,000000000067	0,34	14,39	
	0,0548	0,000000000036	0,32	12,97	
	Veloc. Relat.		Dist. Relat.	Tempo Relat.	
	0,108129243		0,296434695	13,931607143	
	0,293844001		0,807545236	38,504000000	
	0,156295539		0,340154494	14,392500000	
	0,054835504		0,324906367	12,970000000	
	Variação Veloc. Relat.		Variação	Variação	
	0,000029243		0,003565305	0,001607143	
	0,000044001		0,002454764	0,004000000	
	0,000004461		0,000154494	0,002500000	
	0,000035504		0,004906367	0,000000000	

Table 6 – Part of time dilation and contraction of space, author.

Table 6 shows the results of the calculations in relation to the values of the variations set out in simulations of virtualization connections compared to the speed of light. Are described the values of speeds, distances covered, time and variations in virtualization environment reached relativists. The wavelength for the computer operating system, XP, the tunneling period is 9, 88x10 $^{-10s}$ sec, the wavelength of 4, 7 x 10^{-13}m and frequency equal to 1.5 Ghz, which according to the classification of the electromagnetic spectrum is in the range of electromagnetic radiation. On computer B, XP operating system, the period of the tunneling is 26, 92x10 $^{-10}$sec, and the wavelength of 12, 7 x 10^{-13}m and frequency equal to 11.3 Ghz, which according to the classification of the electromagnetic spectrum is in the range of electromagnetic radiation. To computer C, the operating system Windows 7, the tunneling period is 11, 34x10 $^{-10}$sec, and the wavelength of 6, 7 x 10^{-13}m and frequency equal to 2.25 Ghz, which according to the classification of the electromagnetic spectrum is in the range of electromagnetic radiation. To computer D, operating system Windows 7, the tunneling period is 10, 83x10 $^{-10}$sec, and the wavelength of 3, 6 x 10^{-13}m and frequency equal to 0.71 Ghz, which according to the classification of the electromagnetic spectrum is in the range of electromagnetic radiation. Occurs, so a variation of the tunneling of computers A, B, C and D in the virtual environment in relation to the speed of light which are: for the computer to 0.000000000036% in relation to the speed of light; to computer B of 0.000000000098% in relation to the speed of light; to computer C of 0.000000000052% in relation to the speed of light; to computer D of 0.000000000018% in relation to the speed of light.

1	Data	Hora	Máqui	Sistema Operacional	Tempo Conexão	Tempo UOL	Velocidade	Memória RAM	Velocidade	Memória RAM
18	18/1/2014	11h27	A-->B	XP-->XP	5,50	2,60	2,67	3,00	1,73	2,00
19	18/1/2014	11h27	A-->B	XP-->XP	5,50	2,88	2,67	3,00	1,73	2,00
20	18/1/2014	11h27	A-->B	XP-->XP	5,50	2,85	2,67	3,00	1,73	2,00
21	18/1/2014	11h27	A-->B	XP-->XP	5,50	3,22	2,67	3,00	1,73	2,00
30	18/1/2014	11h50	A-->B	XP-->XP	1,50	1,12	2,67	3,00	1,73	2,00
31	18/1/2014	11h50	A-->B	XP-->XP	1,50	1,06	2,67	3,00	1,73	2,00
32	18/1/2014	11h50	A-->B	XP-->XP	1,50	1,21	2,67	3,00	1,73	2,00
33	18/1/2014	11h50	A-->B	XP-->XP	1,50	1,16	2,67	3,00	1,73	2,00
38	18/1/2014	22h15	A-->B	XP-->XP	1,50	32,81	2,67	3,00	1,73	2,00
39	18/1/2014	22h15	A-->B	XP-->XP	1,50	19,25	2,67	3,00	1,73	2,00
40	18/1/2014	22h15	A-->B	XP-->XP	1,50	18,84	2,67	3,00	1,73	2,00
41	18/1/2014	22h15	A-->B	XP-->XP	1,50	12,50	2,67	3,00	1,73	2,00
46	19/1/2014	16h18	A-->B	XP-->XP	1,69	18,82	2,67	3,00	1,73	2,00
47	19/1/2014	16h18	A-->B	XP-->XP	1,69	12,22	2,67	3,00	1,73	2,00
48	19/1/2014	16h18	A-->B	XP-->XP	1,69	17,62	2,67	3,00	1,73	2,00
49	19/1/2014	16h18	A-->B	XP-->XP	1,69	18,81	2,67	3,00	1,73	2,00
54	19/1/2014	18h17	A-->B	XP-->XP	1,68	16,88	2,67	3,00	1,73	2,00
55	19/1/2014	18h17	A-->B	XP-->XP	1,68	17,59	2,67	3,00	1,73	2,00
56	19/1/2014	18h17	A-->B	XP-->XP	1,68	17,35	2,67	3,00	1,73	2,00
57	19/1/2014	18h17	A-->B	XP-->XP	1,68	12,04	2,67	3,00	1,73	2,00
152			A-->B	XP-->XP	2,57	12,44	2,67	3,00	1,73	2,00

Table 7 – Computer data collection in virtualization environment, author.

Table 7 shows the results applied in a computer PC (*Personal Computer*) Intel processor speed of 2.67 GHZ, XP operating system (from Microsoft) with the amount of 3.00 GB RAM and another computer of processor speed of 1.73 GHZ, XP operating system (from Microsoft) with the amount of 2.0 GB RAM, where they were registered: dates, schedules and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main characteristics of the machines used in the virtualization environment of cloud computing.

1	Data	Hora	Máqui	Sistema Operacional	Tempo Conexão	Tempo UOL	Velocidade	Memória RAM	Velocidade	Memória RAM
22	18/1/2014	11h37	B-->A	XP-->XP	1,22	3,75	1,73	2,00	2,67	3,00
23	18/1/2014	11h37	B-->A	XP-->XP	1,22	3,38	1,73	2,00	2,67	3,00
24	18/1/2014	11h37	B-->A	XP-->XP	1,22	3,34	1,73	2,00	2,67	3,00
25	18/1/2014	11h37	B-->A	XP-->XP	1,22	3,35	1,73	2,00	2,67	3,00
26	18/1/2014	11h45	B-->A	XP-->XP	1,33	2,97	1,73	2,00	2,67	3,00
27	18/1/2014	11h45	B-->A	XP-->XP	1,33	0,97	1,73	2,00	2,67	3,00
28	18/1/2014	11h45	B-->A	XP-->XP	1,33	1,37	1,73	2,00	2,67	3,00
29	18/1/2014	11h45	B-->A	XP-->XP	1,33	1,10	1,73	2,00	2,67	3,00
34	18/1/2014	11h57	B-->A	XP-->XP	1,03	3,37	1,73	2,00	2,67	3,00
35	18/1/2014	11h57	B-->A	XP-->XP	1,03	4,22	1,73	2,00	2,67	3,00
36	18/1/2014	11h57	B-->A	XP-->XP	1,03	3,90	1,73	2,00	2,67	3,00
37	18/1/2014	11h57	B-->A	XP-->XP	1,03	4,15	1,73	2,00	2,67	3,00
42	18/1/2014	22h23	B-->A	XP-->XP	1,47	4,31	1,73	2,00	2,67	3,00
43	18/1/2014	22h23	B-->A	XP-->XP	1,47	3,38	1,73	2,00	2,67	3,00
44	18/1/2014	22h23	B-->A	XP-->XP	1,47	3,56	1,73	2,00	2,67	3,00
45	18/1/2014	22h23	B-->A	XP-->XP	1,47	3,37	1,73	2,00	2,67	3,00
50	19/1/2014	16h21	B-->A	XP-->XP	1,47	3,53	1,73	2,00	2,67	3,00
51	19/1/2014	16h21	B-->A	XP-->XP	1,47	3,19	1,73	2,00	2,67	3,00
52	19/1/2014	16h21	B-->A	XP-->XP	1,47	3,32	1,73	2,00	2,67	3,00
53	19/1/2014	16h21	B-->A	XP-->XP	1,47	3,28	1,73	2,00	2,67	3,00
58	19/1/2014	18h23	B-->A	XP-->XP	1,63	3,56	1,73	2,00	2,67	3,00
59	19/1/2014	18h23	B-->A	XP-->XP	1,63	3,25	1,73	2,00	2,67	3,00
60	19/1/2014	18h23	B-->A	XP-->XP	1,63	7,91	1,73	2,00	2,67	3,00
61	19/1/2014	18h23	B-->A	XP-->XP	1,63	3,32	1,73	2,00	2,67	3,00
153			B-->A	XP-->XP	2,09	3,46	1,73	2,00	2,67	3,00

Table 8 – data collection the virtualization environment computing, author.

Table 8 shows the results applied in a computer *Notebook* Intel processor 1.73 GHZ speed, operating system XP (from Microsoft) with the amount of 2.00 GB RAM and another computer PC (*Personal Computer*) speed of 2.67 GHZ processor, XP operating system (from Microsoft) with the amount of 3.0 GB RAM, where they were registered: dates, schedules and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main characteristics of the machines used in the virtualization environment of cloud computing.

1	Data	Hora	Máqui	Sistema Operacional	Tempo Conexão	Tempo UOL	Velocidade	Memória RAM	Velocidade	Memória RAM
89	20/1/2014	20h47	A-->C	XP-->Windows 7	0,94	1,31	2,67	3,00	2,50	6,00
94	21/1/2014	09h18	A-->C	XP-->Windows 7	1,25	1,19	2,67	3,00	2,50	6,00
95	21/1/2014	09h18	A-->C	XP-->Windows 7	1,25	1,07	2,67	3,00	2,50	6,00
96	21/1/2014	09h18	A-->C	XP-->Windows 7	1,25	0,81	2,67	3,00	2,50	6,00
97	21/1/2014	09h18	A-->C	XP-->Windows 7	1,25	1,56	2,67	3,00	2,50	6,00
102	21/1/2014	15h06	A-->C	XP-->Windows 7	1,25	0,46	2,67	3,00	2,50	6,00
103	21/1/2014	15h06	A-->C	XP-->Windows 7	1,25	1,21	2,67	3,00	2,50	6,00
104	21/1/2014	15h06	A-->C	XP-->Windows 7	1,25	1,72	2,67	3,00	2,50	6,00
105	21/1/2014	15h06	A-->C	XP-->Windows 7	1,25	1,63	2,67	3,00	2,50	6,00
110	22/1/2014	09h15	A-->C	XP-->Windows 7	0,62	0,75	2,67	3,00	2,50	6,00
111	22/1/2014	09h15	A-->C	XP-->Windows 7	0,62	1,00	2,67	3,00	2,50	6,00
112	22/1/2014	09h15	A-->C	XP-->Windows 7	0,62	0,94	2,67	3,00	2,50	6,00
113	22/1/2014	09h15	A-->C	XP-->Windows 7	0,62	1,09	2,67	3,00	2,50	6,00
118	22/1/2014	13h29	A-->C	XP-->Windows 7	1,34	0,72	2,67	3,00	2,50	6,00
119	22/1/2014	13h29	A-->C	XP-->Windows 7	1,34	0,59	2,67	3,00	2,50	6,00
120	22/1/2014	13h29	A-->C	XP-->Windows 7	1,34	0,47	2,67	3,00	2,50	6,00
121	22/1/2014	13h29	A-->C	XP-->Windows 7	1,34	1,06	2,67	3,00	2,50	6,00
154			A-->C	XP-->Windows 7	1,07	1,19	2,67	3,00	2,50	6,00

Table 9 – Data collection the virtualization environment computing, author.

Table 9 shows the results applied in a computer PC *(Personal Computer)* Intel processor speed of 2.67 GHZ, XP operating system (from Microsoft) with the amount of 3.00 GB RAM memory and other computer *Notebook* processor 2.5 GHZ speed, operating system Windows 7 (from Microsoft) with the amount of 6.0 GB RAM where were recorded: the dates, times and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main characteristics of the machines used in the virtualization environment of cloud computing.

1	Data	Hora	Máqui	Sistema Operacional	Tempo Conexão	Tempo UOL	Velocidade	Memória RAM	Velocidade	Memória RAM
90	20/1/2014	20h49	C-->A	Windows 7-->XP	0,91	3,54	2,50	6,00	2,67	3,00
91	20/1/2014	20h49	C-->A	Windows 7-->XP	0,91	3,44	2,50	6,00	2,67	3,00
92	20/1/2014	20h49	C-->A	Windows 7-->XP	0,91	2,25	2,50	6,00	2,67	3,00
93	20/1/2014	20h49	C-->A	Windows 7-->XP	0,91	3,41	2,50	6,00	2,67	3,00
98	21/1/2014	09h21	C-->A	Windows 7-->XP	1,13	3,38	2,50	6,00	2,67	3,00
99	21/1/2014	09h21	C-->A	Windows 7-->XP	1,13	3,31	2,50	6,00	2,67	3,00
100	21/1/2014	09h21	C-->A	Windows 7-->XP	1,13	3,28	2,50	6,00	2,67	3,00
101	21/1/2014	09h21	C-->A	Windows 7-->XP	1,13	3,12	2,50	6,00	2,67	3,00
106	21/1/2014	15h08	C-->A	Windows 7-->XP	1,25	3,19	2,50	6,00	2,67	3,00
107	21/1/2014	15h08	C-->A	Windows 7-->XP	1,25	4,21	2,50	6,00	2,67	3,00
108	21/1/2014	15h08	C-->A	Windows 7-->XP	1,25	3,44	2,50	6,00	2,67	3,00
109	21/1/2014	15h08	C-->A	Windows 7-->XP	1,25	3,57	2,50	6,00	2,67	3,00
114	22/1/2014	09h18	C-->A	Windows 7-->XP	0,94	3,47	2,50	6,00	2,67	3,00
115	22/1/2014	09h18	C-->A	Windows 7-->XP	0,94	3,50	2,50	6,00	2,67	3,00
116	22/1/2014	09h18	C-->A	Windows 7-->XP	0,94	3,19	2,50	6,00	2,67	3,00
117	22/1/2014	09h18	C-->A	Windows 7-->XP	0,94	3,28	2,50	6,00	2,67	3,00
122	22/1/2014	13h32	C-->A	Windows 7-->XP	1,06	3,60	2,50	6,00	2,67	3,00
123	22/1/2014	13h32	C-->A	Windows 7-->XP	1,06	3,25	2,50	6,00	2,67	3,00
124	22/1/2014	13h32	C-->A	Windows 7-->XP	1,06	3,37	2,50	6,00	2,67	3,00
125	22/1/2014	13h32	C-->A	Windows 7-->XP	1,06	3,41	2,50	6,00	2,67	3,00
155			C-->A	Windows 7-->XP	1,09	3,56	2,50	6,00	2,67	3,00

Table 10 – Data collection the virtualization environment computing, author.

Table 10 shows the results applied in a computer *Notebook* processor 2.5 GHZ speed, operating system Windows 7 (from Microsoft) with the amount of 6.0 GB RAM and another computer of type PC *(Personal Computer)* Intel processor speed of 2.67 GHZ, XP operating system (from Microsoft) with the amount of 3.00 GB RAM where were recorded: the dates, times and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main characteristics of the machines used in the virtualization environment of cloud computing.

1	Data	Hora	Máqui	Sistema Operacional	Tempo Conexão	Tempo UOL	Velocidade	Memória RAM	Velocidade	Memória RAM
126	22/1/2014	13h46	A-->D	XP-->Windows 7	3,10	8,84	2,67	3,00	1,20	2,00
127	22/1/2014	13h46	A-->D	XP-->Windows 7	3,10	17,16	2,67	3,00	1,20	2,00
128	22/1/2014	13h46	A-->D	XP-->Windows 7	3,10	13,85	2,67	3,00	1,20	2,00
129	22/1/2014	13h46	A-->D	XP-->Windows 7	3,10	20,12	2,67	3,00	1,20	2,00
134	23/1/2014	08h04	A-->D	XP-->Windows 7	2,06	6,28	2,67	3,00	1,20	2,00
135	23/1/2014	08h04	A-->D	XP-->Windows 7	2,06	4,81	2,67	3,00	1,20	2,00
136	23/1/2014	08h04	A-->D	XP-->Windows 7	2,06	12,03	2,67	3,00	1,20	2,00
137	23/1/2014	08h04	A-->D	XP-->Windows 7	2,06	4,47	2,67	3,00	1,20	2,00
142	23/1/2014	14h54	A-->D	XP-->Windows 7	1,91	8,28	2,67	3,00	1,20	2,00
143	23/1/2014	14h54	A-->D	XP-->Windows 7	1,91	3,47	2,67	3,00	1,20	2,00
144	23/1/2014	14h54	A-->D	XP-->Windows 7	1,91	4,50	2,67	3,00	1,20	2,00
145	23/1/2014	14h54	A-->D	XP-->Windows 7	1,91	4,09	2,67	3,00	1,20	2,00
156			A-->D	XP-->Windows 7	2,36	8,99	2,67	3,00	1,20	2,00

Table 11 – Data collection the virtualization environment computing, author.

Table 11 shows the results applied in a computer PC *(Personal Computer)* Intel processor speed of 2.67 GHZ, XP operating system (from Microsoft) with the amount of 3.00 GB RAM memory and other computer *Notebook* processor 1.2 GHZ speed, operating system Windows 7 (from Microsoft) with the amount of 2.0 GB RAM where were recorded: the dates, times and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main characteristics of the machines used in the virtualization environment of cloud computing.

1	Data	Hora	Máqui	Sistema Operacional	Tempo Conexão	Tempo UOL	Velocidade	Memória RAM	Velocidade	Memória RAM
130	22/1/2014	13h49	D-->A	Windows 7-->XP	1,71	4,06	1,20	2,00	2,67	3,00
131	22/1/2014	13h49	D-->A	Windows 7-->XP	1,71	3,63	1,20	2,00	2,67	3,00
132	22/1/2014	13h49	D-->A	Windows 7-->XP	1,71	3,38	1,20	2,00	2,67	3,00
133	22/1/2014	13h49	D-->A	Windows 7-->XP	1,71	3,41	1,20	2,00	2,67	3,00
138	23/1/2014	08h07	D-->A	Windows 7-->XP	1,84	3,37	1,20	2,00	2,67	3,00
139	23/1/2014	08h07	D-->A	Windows 7-->XP	1,84	3,18	1,20	2,00	2,67	3,00
140	23/1/2014	08h07	D-->A	Windows 7-->XP	1,84	3,37	1,20	2,00	2,67	3,00
141	23/1/2014	08h07	D-->A	Windows 7-->XP	1,84	3,22	1,20	2,00	2,67	3,00
146	23/1/2014	14h59	D-->A	Windows 7-->XP	2,12	3,54	1,20	2,00	2,67	3,00
147	23/1/2014	14h59	D-->A	Windows 7-->XP	2,12	3,21	1,20	2,00	2,67	3,00
148	23/1/2014	14h59	D-->A	Windows 7-->XP	2,12	3,50	1,20	2,00	2,67	3,00
149	23/1/2014	14h59	D-->A	Windows 7-->XP	2,12	4,03	1,20	2,00	2,67	3,00
157			D-->A	Windows 7-->XP	1,89	3,49	1,20	2,00	2,67	3,00

Table 12 – Data collection the virtualization environment computing, author.

Table 12 shows the results applied in a computer *Notebook* Intel processor 1.2 GHZ speed, operating system Windows 7 (from Microsoft) with the amount of 2.00 GB RAM and another computer PC (*Personal Computer*) speed of 2.67 GHZ processor, XP operating system (from Microsoft) with the amount of 3.0 GB RAM where were recorded: the dates, times and the time required to connect to a site (UOL). At the end of the table is recorded the average time for the connections and the main characteristics of the machines used in the virtualization environment of cloud computing.

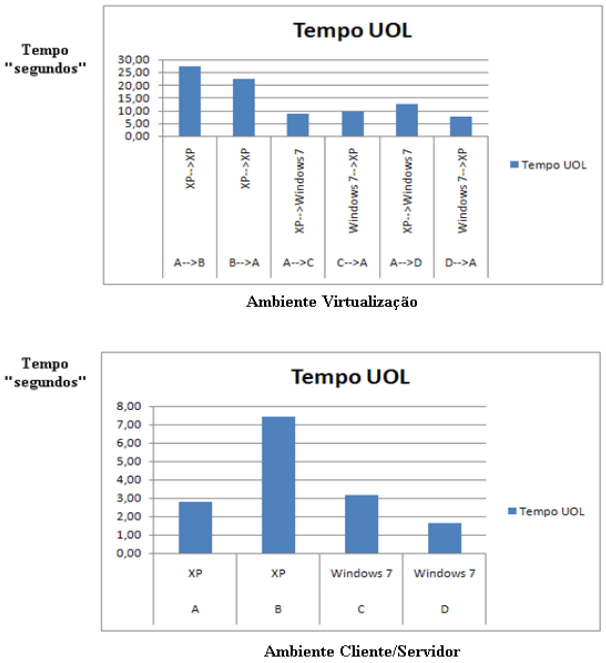

Figure 7-Graphical analysis of client/server environments and virtualization, author.

Considering the observations and graphical analysis of results presented in Figure 7, the machines and operating systems used have a speed rating and access to the site "UOL" in ascending order the computers: D, A, C and B. However, when running in the virtual environment the slower computers can be faster when run on faster computers or vice-versa.

Máquina	Sistema Operacional	Tempo Conexão	Tempo UOL	Velocidade	Memória RAM	Velocidade	Memória RAM
A-->B	XP-->XP	9,24	27,16	2,67	3,00	1,73	2,00
B-->A	XP-->XP	7,51	22,25	1,73	2,00	2,67	3,00
A-->C	XP-->Windows 7	3,62	8,87	2,67	3,00	2,50	6,00
C-->A	Windows 7-->XP	3,75	9,42	2,50	6,00	2,67	3,00
A-->D	XP-->Windows 7	4,25	12,48	2,67	3,00	1,20	2,00
D-->A	Windows 7-->XP	3,21	7,49	1,20	2,00	2,67	3,00

Máquina	Sistema Operacional	Tempo UOL	Velocidade	Memória RAM
A	XP	2,76	2,67	3,00
B	XP	7,44	1,73	2,00
C	Windows 7	3,15	2,50	6,00
D	Windows 7	1,65	1,20	2,00

λ=v*T(cm)	Velocidade de Conexão (cm/s)
16,69	13,68
13,23	12,36
12,81	11,97
0,13	11,97
0,00	0,00
0,00	0,00

Figure 8 – Analysis of the results of the client/server environments and virtualization, author.

Figure 8 shows the connection speeds of the machines tested and the average data transmission in the virtual environment. The results of their frequencies and wavelengths are within the ranges of UHF frequencies above, according to the table of frequency spectra in Figure 9 the standardization ITU (*International Telecommunications Union-Telecommunication*).

Alto frequência High frequency	HF	7	3–30 MHz	100 m – 10 m
Muito alta frequência Very high frequency	VHF	8	30–300 MHz	10 m – 1 m
Ultra alta frequência Ultra high frequency	UHF	9	300–3000 MHz	1 m – 100 mm
Super alta frequência Super high frequency	SHF	10	3-30 GHz	100 mm – 10 mm
Extra alta frequência Extremely high frequency	EHF	11	30-300 GHz	10 mm – 1 mm
			Acima dos 300 GHz	< 1 mm

Figure 9 – Table of frequency Spectra ITU-T (*International Telecommunications Union-Telecommunication*).

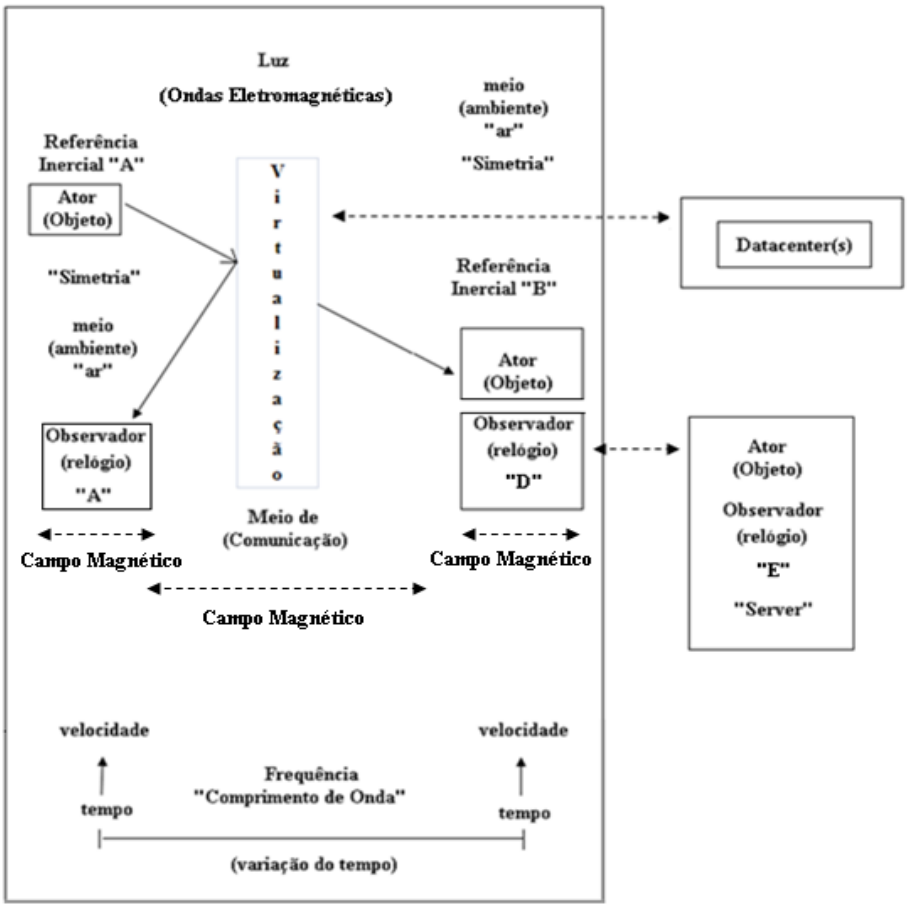

Figure 10 – Analysis of the magnetic field on the virtualization environments, objects and time, author.

Figure 10 shows the relationship and the results obtained in this work on the relativistic vision applied to virtualization in corporate networks using the principles of tunneling to connect and Exchange data on cloud computing. It is observed that the light and the magnetic field have a direct influence in relation to objects: actor, the observers, the time registered by watches, the frequency waves, the speed and the means of communication established by virtualization. Virtualization allows the resources of *Datacenters* are shifted to the virtualization environment, with this we can observe the concepts of relativity about the time relativity related concurrency.

Considering the evolution of semiconductor technology and its limits of *chips* CMOS (Metal Oxide Semiconductor), an issuer of waves from the 340 Mhz frequency, the UHF wave spectrum (*Ultra High Frequency*), thus going on to work in the field of the effects of quantum physics (JUNIOR, SAUVÉ and MC, 1996). At this frequency the behavior of the electrons becomes unpredictable (known as tunneling of electrons). In virtualization these limitations will not exist, because the tunneling and behavior in data exchange and

communications are under the responsibility only of the magnetic fields or speed of light. Because if notes that the displacement of objects horizontally about virtualization does not suffer from magnetic field deviation, however when moving horizontally virtualization the magnetic field points to the original position of the displacement, thus it is considered that the speed of light is a universal constant, is the same in all inertial reference systems in the vacuum, does not depend on the motion of the light source and has equal value in all directions, according to the postulate of Einstein's special theory of relativity. Under these conditions the length contraction may occur, but the relative speed does not suffer contraction. There is also the physical occurrence in a point set space and moment of time. In accordance with the principles of relativity, all the physical laws are the same in relation to any reference, because the speed of light is independent of how the references to move towards others.

IV. CONCLUSION

This work had as objective to analyze and propose a model and quantum relativistic vision with the possibility of being implemented with the principles of Physics in virtualization of *Datacenters* in corporate networks. On the basis of the comments of the applications and infrastructure and internet technologies the IT environment has reduced their costs with the use of virtualization of *Datacenters*. In physics light wave property in addition to being an electromagnetic wave is associated with the emission and absorption of light, also carries energy and light source, which are present in the electronic components in computers. So it is known that the direction of a ray of light varies as it passes from one material to another with different refractive index, but in relation to the wave frequency does not vary according to the laws of physics and theory of Einstein should be the same in any inertial reference systems. The theory of relativity and concurrency involves the main concepts of measure of time and time intervals and describes that concurrency is not an absolute concept, because two events occur simultaneously or not. Concurrency is important for the measurement of time intervals and length contraction may occur, while the relative velocity does not suffer contraction. An event is a fundamental principal of relativity and can be observed and measured by observers in different frames, whereas in concurrency, event is what actually happens. All the laws of physics are the same in relation to any reference and the value of the speed of light in different references propagate with the same speed of light in any inertial frame of reference. These concepts and fundamentals are parts of application virtualization of *Datacenters*.

The choice of measurements of the properties for the actors in the virtualization environment determines the correlations that exist for these results, because the application of quantum mechanics establishes the super positions of the actors (companies) and behaviors as if they were in multiple places simultaneously. However, the study and the results presented can serve as a basis for further work involving quantum computing vision applied in corporate networks and the presentation of the structure to the development of a quantum computer.

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