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Software Evolution as SaaS: Evolution of Intelligent Design in Cloud

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Abstract

The aim of this paper is to establish an understanding of software evolution as Software as a Service in the Cloud as a concept in comparison to Biological evolution. Software evolution is a concept that requires a deep understanding for the course of our use in the future and is an important knowledge that can bring in a change of view towards software development altogether. There are several issues of software evolvability provided in this paper. Resolution to these issues through time with software dispersion can be understood as biological inheritance. Study of biological evolution to produce compound adaptive distinction could shed the light on how software evolution can be understood in general and in meticulous understanding of evolutionary computation. We study and accumulate the divergences and possible similarities between biological and software evolution toward the end of this paper.

Keywords: Architecture, Cloud Computing, Cloud Services, Services, Service Oriented Architecture, Software as a Service.

1. Introduction

Biological evolution is a well understood and studied concept. It is an important aspect to know that this type of evolution has given us the proof of a common descent for millions of years. The process we call as a common descent means that all species share common ancestors. A well known quote from

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Theodosius Dobzhansky tells us the significance and use of biological comprehension about evolution within the life sciences that "Nothing in biology makes sense except in the light of evolution" [01].
Software as a service Evolution is considered by Lehman is most well-known for its eight "Laws of software evolution"[02]. The first two:
1. Software must continually evolve, or grow useless, and
2. The structure of evolving software as a service tends to degrade.
A software engineer initiates an artifact, which we now call software as a service on the basis of provided requirements by requiring stakeholders in Cloud. Each and every software as a service is designed, developed and later deployed to achieve goals on the basis of given requirements for a certain time period until any change is to occur within the stakeholder organization's currently provided state. It is an eventual target of every software engineer to keep design simple as well as optimal and precise.
Section 2 contains discussions on biological evolution in relation to population and their crossover and gene mutation. Software as a service evolution and change is given in section 3 with a case study of software as a service instantiation. On the basis of these given sections a detailed discussion is given on an analysis of software as a service evolution and its understanding in section 4.

2. Biological Evolution: An Understanding

Change in living species with the pace of time due to several environmental factors is the basis of biological evolution. Living beings are adaptable to survive in accordance to the different environmental factors, such as:

- Weather
- Plantation
- Availability of food and water
- Terrain
- etc…

This evolution can also be understood on the basis of crossover and mutation. As per authors [03] of text book of Zoology "this is a phenomenon in which exchange of chromosomal segment or genetic material occurs between the non-sister homologous chromosomes". To make it understandable to the computing community we can also say that there is an exchange of information process happening between two individuals of same species (such as humans or animals etc.) to generate a child as a parent. A random selection is done by the crossover and operator, which selects one cutpoint from the gross information of both parents. This causes that the resulting child as an individual, which can have a different length, width and breadth than either of its parents. This study explains the evolution of life using and basing on information transmission and the main transfer of energy through living systems compositions. These compositions can be decomposed of following:

- Species and
- Population

A general understanding of population can be as a group of individuals belonging to the same species. The species is a group of organisms that can reproduce with one another and produce members of this population as described earlier in the concept of crossover and mutation [04]. Every species as an organism have a set of detailed distinctiveness, which is called as having various traits. Inheritance of living organisms is controlled by genes. A gene is a portion of DNA molecule. An entire set of genes is called a genotype and is a part of an organism's genome. An entire set of visible traits that make up the structure and behaviour of an organism is called phenol type, like skin, hair color, height and shape of any species can be few good examples. These traits come from the communication of its genotype with the atmosphere of the species.

As per figure 1, Charles Darwin claimed in 1859 that "The origin of species by means of natural selection or the preservation of favored races in the struggle for life". Biological evolution can also be understood as chaotic elevation and collapse of species, such as humans can be a good example of