

ԿՐԹԱԿԱՆ ՆՈՐ ՏԵԽՆՈԼՈԳԻԱՆԵՐ  
NEW EDUCATIONAL TECHNOLOGIES  
НОВЫЕ ОБРАЗОВАТЕЛЬНЫЕ ТЕХНОЛОГИИ

USE TRIPLE H-AVATAR TECHNOLOGY FOR EDUCATION IN ONLINE  
MULTI-CLOUD PLATFORM LAB

ORCID 0000-0003-4871-5956

**Mkrttchian Vardan Suren<sup>1a\*</sup> and Vasin Sergey Mikhailovich<sup>2,b</sup>**

<sup>1</sup>Full address of first author (HHH University, North Ryde, Sydney, Australia),

ORCID /0000-0002-0371-5517

<sup>2</sup>Penza State University, Penza, RF,

\*Corresponding author



V.S. Mkrtchyan, Doctor of Economic Sciences,  
Professor, Australia

**Abstract.** One could argue that the traditional scheme of education needs to change. New forms of education should be based on mobility, interactivity and cooperation of the participants of the education process. To this end, there should be new approaches education. Now they say about study-oriented re-searching without temporal and spatial boundaries, which requires the use of new education technologies – H Avatar. Currently there is no software system that would realize the full intellectual tasks described above. The reason for this lies in the simplified model of learning, which is associated with the unification of the parameters of the model education and the study material. Note that even this approach requires considerable effort in the implementation of both the local and remote versions.

## 1. Introduction

The problem of the modeling with simulation is the general adaptive method of research and develops in information sciences and technology (IS & T). Active participation of end user in a virtual community is a powerful indicator of the person's interests, preferences, beliefs and social context. The scientists use a method of modeling with simulation known as Quantitative Structure-Activity Relationships (QSAR) experimental data for patterns that relate the chemical structure of a drug to its kinase activity (Mkrttchian V., 2011). QSAR modeling is a research field with over 40 years of history. A number of approaches and methods to support the modeling exist, yet it is difficult to find systems;



Vasin. S.M. Doctor of Economic Sciences, Professor

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## 2. Background

The organization of high-tech production of cross-platform software systems for virtual laboratories based on the innovative modular service-oriented architecture for the creation of interactive learning and socio-cultural multimedia-rich content and adaptive to various categories of end-users by means of multi-service networks in a heterogeneous environment with reference to different subject areas is one of the actual problems of information science and technology and in the field of research and development of modern. Many on-line learning support and delivering software systems such as WebCT, Blackboard, WizIQ etc., are used by distance education instructors to develop and deploy online courses. These software systems normally integrate such desired functions as presentation of the course modules, educational tools to facilitate learning, communication support through email, online chat room, group collaboration through discussion pages and whiteboard, course assessment tools for preparing quiz and self-evaluation, and administrative tools to assist the process of management and continuing improvement of the course. However, technological realities and lab hardware requirements/constraints of these software systems present challenges to educators who want to develop online technical courses in the fields of engineering or engineering technology with physical laboratory activities. As part of the literature review found that, as a valid platform is not universal for the development, presentation and support of interactive multimedia-rich applications with advanced integration and social and communication capabilities and collaboration tools of experimental work (virtual labs). Therefore, we decided to provide tools for the organization of joint research, training and practical work of students on a special website - a virtual lab. Our task was to create a high-tech cloud platform for creating networked virtual laboratories with a maximum price and time efficiency with an adaptive system that determines the style of work and user education and adapts to the features of its intellectual property. Using our educational platform Triple H - AVATAR networking students will encourage the exchange of knowledge between learners and the formation of dynamic self-learning communities (Mkrttchian V., 2015). Ensuring the integration of heterogeneous components of complex information systems, production systems and multimedia services with high interactivity, user-developed communication and adaptation to the context of their use in the implementation of the requirements for reliability, fault tolerance, ergonomics and ubiquity

of access without restrictions for the type of software and hardware platform will provide the research intensity of lab Multi-Cloud Platform. This will allow for the first time to implement an open social networking environment for users of virtual labs, providing various kinds of communications between users inside and virtual laboratories (Mkrttchian V., Aleshina E., 2917).

### **3. Issues, Controversies, Problems**

It can automate and accelerate QSAR model building by using cluster resources. The system offers a rich set of tools for data pre-processing, analysis, descriptor calculating and model building. Similarly to our use case, the tools can be assembled to build online Multi-Cloud Platform Lab. modeling workflows using a graphical interface. However, as there is not much information revealed regarding the performance of online Multi-Cloud Platform Lab., we could only found that it is able to reduce modeling time from days to hours. In contrast, we report nearly 180 times processing speed-up, i.e. months to hours or years today's reduction. Definitely, a valuable feature of the system is that as the basic unit of work it uses a workflow rather than task invocation. Not only does it increase the run time of an invocation, which improves effectiveness, but also it allows for fast data transfer between the subsequent services. Unlike Falcon and other solutions based on task scheduling, blocks in our system communicate using local disk rather than shared file system; an important property for cloud-based systems in which users also pay for network train.

Functional modeling of the risk management process of Enterprise Resource Planning on lab Multi-Cloud Platform has allowed us to solve the problem of compliance with the standard software platforms, as well as to identify modern and future issues, concepts, trends and solutions of IS&T (Mkrttchian V., Aleshina E., 2917). Virtual Education Environment (VEE) allows us to introduce a new format for research, teaching and learning through the transfer of real interaction between researcher's student and teacher in the digital plane. In this case, the role of the researcher, the student and the teacher perform avatars that interact with each other. The results of study, training and interaction in this format may be evaluated in a digital form (Mkrttchian V., Kataev M., Shih T., Kumar M., Fedotova A., 2014). This fact allows us to introduce digital control techniques format of research. When controlling dynamic systems, which include the process of research, often seeks to achieve the optimum in some sense or another. The optimality criterion can be a minimum of transition from one state to another. Is a natural requirement of continuity and smoothness of the transition? Requiring a minimum of time and the smoothness of the transition process is a significant constraint on the development of stable algorithms. Known is for a lot of digital methods of various objects. We propose a path for management researching and learning to use a control algorithm using sliding mode. The control method using a slide is simple and highly reliable because it involves forcing management to cause the process to flow in a definite path, defined by the developer. When researching and training the system state is the level, quality and pace of acquired knowledge to researcher's and students. In different situations, in study and education there is the need to adjust the learning process that occurs when fast or slow uptake, increasing or decreasing the complexity of tasks, etc. The dynamic characteristics of the system can be well described by the phase plane when one variable is responsible for the deviation of the measured values from the set, and the other for the speed deviation.

In such a plane can be divided into two paths: the acceleration and braking. Sliding effect occurs when a change in environmental conditions is necessary to switch from one path to another. Clearly, it is impossible to instantly make this transition, and as a result there is a delay transition process. The angle of the transition path should be equal to or less than the angle of inclination of the tangent to the trajectory at which the transition occurs. These components sliding mode and determine the relevance of this approach in practice, including its selection for use in the problem of changing the trajectory of research in the VEE. The students and researcher's has in the interaction with the VRE which generates the events in the environment (Registration, choice researching or learning path, object, learning materials, assignments, etc.).

These events are classified and sent to the Interpreter performance specific event handlers, actions, scripts or scenes. Processors using the feedback system associated with the generators of certain actions, scripts or scenes. Events can operate as an administrator of VEE and moderator, disconnecting with the opportunity for feedback and choosing certain actions, scripts or scene by certain rules. The exclusive role of research provides the status of the state in the global market, as well as the democratization of society and the balance of its development. Modern researching or education is committed to the formation, education and personal development, able to self-knowledge, self-determination, and self-development of creative and critical thinking. Developments in information science and technology in modern education causes the appearance of new forms of interaction between the participants of the research process.

#### **4. Solutions and Recommendations**

Discussion of possible solutions and recommendations for addressing the issues and problems presented in the previous section is on the basis of comparative analysis tools for automated testing lab Multi-Cloud Platform. This will allow the platform to model the entire real situation and to find current and possible future problems of Information Sciences and Technology, definitions of concepts, trends and solutions.

Ways to solve these problems, you can choose a variety: from the use of ready-made solutions to writing the protocol networking. This paper compares different approaches solving the problem and the tools most appropriate to achieve this goal. Cloud systems for testing solutions are used, as has been proven time and suitable for distributed systems (optional cloud) and new, developed specifically for working with Cloud-providers. In principle, it does not matter whether you use a framework or an existing design - to solve the problem of remote control cars will still have regardless of the host OS. Both programs are discussed below provide access to the remote machine, and some functionality for working with her. As a moderator and researcher have the ability to communicate directly to the VEE or using their own avatars. Communication moderator and researcher occur within that set standard deviation (communication control system) (Mkrttchian V., Kataev M., Hwang W., Bedi S., Fedotova, A., 2014). The control system of communication provides feedback between VEE and research system tasks. The study system task regulates the researching process (stages: experiments, tests, control) and builds on the recommendations of the study process systems of knowledge test. The inspection system assesses the state of knowledge (level) knowledge of and compliance with researcher number of knowledge and level of expertise. The role of expert in the

process controls. Chooses a plan (path) study research and provides relevant material for this purpose, which is stored in the knowledge base (knowledge base). Administration Knowledge and conducted moderator (technical administration, we do not consider). All issued assignments, the results of the moderator and the researcher, the activity of study recorded in the database (the database).and emerging trends. Provide insight about the future of the book's theme from the perspective of the chapter focus. Viability of a paradigm, model, implementation issues of proposed programs, etc., may be included in this section. If appropriate, suggest future research opportunities within the domain of the topic.

## **5. Future Research Directions**

You cannot say that this approach and innovative techniques, but they are generally accepted and used can achieve a good positive return. It is difficult to say in what direction will the technique, but now allows its use as soon as possible to arrange a single interface between all instances involved in the testing and provide standard functionality on the host OS. Using Triple H – AVATAR Technology, we were able to the existing online Multi-Cloud Platform Lab modeling pipeline and run it effectively in the cloud. Meanwhile several important lessons were learnt. Reducing the amount of data transfers between the server and the engines was of major impact on scalability and processing effectiveness. We used the blob store that proved to be scalable enough to overcome a bottleneck related to communication with the central data repository. Switching to the storage was as simple as adding to the palette of existing blocks a few new I/O services (100–150 lines of Java code each) and changing the existing I/O blocks in all related workflows. Moreover, by expressing service software dependencies we could extract most of blocks 'code in the form of shared libraries. This minimized overheads related to downloading service code by the engines.

Further reductions in the amount of data transferred were possible by enabling users to turn off sending blocks 'status data after completion of a workflow invocation.

Users can decide whether they need faster execution or more detailed status information. Finally, online Multi-Cloud Platform Lab uses workflow invocation as the basic unit of work. Workflows are usually designed to be a consistent and logical part of the whole scientific analysis and research.

## **6. Summary**

We presented a fast and scalable way to perform the exploration of online Multi-Cloud Platform Lab. model space. The acceleration achieved is much beyond what existing solutions can offer. Overall, the cloud computing model is a very good fit for the presented scenario. After processing of the thousand input data sets from HHH University, further efforts with online Multi-Cloud Platform Lab. modeling will require much less resource. The database is regularly updated, thus we can extract several hundred new input datasets every three months. This is less than 10% of the current data- base size, and so we will need a fraction of the resources to process it effectively. Also, the development of new model building and descriptor selection algorithms can be tested on a relatively small part of the input sets and for only the most promising ones the whole input data will be applied. Importantly,

introducing new model building algorithms can reuse data from previous invocations reducing the need for large computing resources even more.

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### **ՈՒՍՈՒՑՄԱՆ ԳՈՐԾԸՆԹԱՅՈՒՄ TRIPLE H-AVATAR ՏԵԽՆՈԼՈԳԻԱՆԵՐԻ ՕԳՏԱԳՈՐԾՈՒՄԸ ԲԱԶՄԱՄՊ ՀԱՐԹԱՎԵՐՈՎ ՕՆԼԱՅՆ ԼԱԲՈՐԱՏՈՐԻԱՆԵՐՈՒՄ**

**Մկրտչյան Վարդան Ս., Վասին Սերգեյ Մ.**

**Ամփոփում:** Մենք ներկայացրել ենք մոդելային տարածքի բազմաամպային հարթակների առցանց լաբորատորիան ուսումնասիրելու արագ և մասշտաբային միջոց: Ձեռք բերված արագացումը գերազանցում է գոյություն ունեցող լուծումները: Ընդհանուր առմամբ,

ամայային հաշվարկման մոդելը շատ լավ է համապատասխանում ներկայացված թեմային: HHH համալսարանի մուտքային տվյալների հազարավոր հավաքածուներ մշակելուց հետո, առցանց Multi-Cloud Platform Lab-ի հետագա ջանքերը կպահանջեն շատ ավելի քիչ մոդելավորման ռեսուրսներ: Տվյալների բազան պարբերաբար թարմացվում է, այնպես որ մենք կարող ենք երեք ամիսը մեկ մի քանի հարյուր նոր մուտքեր հանել: Մա չի գերազանցում տվյալների բազայի ներկայիս չափի 10%-ը, ուստի այն արդյունավետ մշակելու համար մեզ անհրաժեշտ է ռեսուրսների փոքր մասը: Մոդելների կառուցման և նկարագրիչների ընտրության նոր ալգորիթմների մշակումը կարող է փորձարկվել նաև մուտքային հավաքածուների համեմատաբար փոքր մասի վրա, և միայն դրանցից ամենահեռանկարայինների համար կկիրառվեն բոլոր մուտքային տվյալները: Կարևոր է նշել, որ նոր մոդելների կառուցման ալգորիթմների ներդրումը կարող է վերօգտագործել նախորդող տվյալները՝ հետագայում նվազեցնելով հաշվողական մեծ ռեսուրսների անհրաժեշտությունը:

**Բանալի բառեր.** H-Avatar, կրթություն, տեխնոլոգիա, մոդելավորում:

## **USE TRIPLE H-AVATAR TECHNOLOGY FOR EDUCATION IN ONLINE MULTI-CLOUD PLATFORM LAB**

**Mkrtchyan Vardan S., Vasin Sergey M.**

**Summary:** We presented a fast and scalable way to perform the exploration of online Multi-Cloud Platform Lab. model space. The acceleration achieved is much beyond what existing solutions can offer. Overall, the cloud computing model is a very good fit for the presented scenario. After processing of the thousand input data sets from HHH University, further efforts with online Multi-Cloud Platform Lab. modeling will require much less resource. The database is regularly updated, thus we can extract several hundred new input datasets every three months. This is less than 10% of the current data- base size, and so we will need a fraction of the resources to process it effectively. Also, the development of new model building and descriptor selection algorithms can be tested on a relatively small part of the input sets and for only the most promising ones the whole input data will be applied. Importantly, introducing new model building algorithms can reuse data from previous invocations reducing the need for large computing resources even more.

**Key words.** H-Avatar, Education, Technology, Modeling.

## **ИСПОЛЬЗОВАНИЕ ТЕХНОЛОГИИ TRIPLE H-AVATAR ДЛЯ ОБУЧЕНИЯ В ОНЛАЙН-ЛАБОРАТОРИЯХ НА МУЛЬТИОБЛАЧНЫХ ПЛАТФОРМАХ**

**Мкртчян Вардан С., Васин Сергей М.**

**Резюме.** Мы представили быстрый и масштабируемый способ исследования онлайн-лаборатории мультиоблачных платформ модельного пространства. Достигнутое скорение выходит за рамки того, что могут предложить существующие решения. В целом модель облачных вычислений очень хорошо подходит для представленного сценария. После обработки тысячи наборов входных данных из Университета ННН дальнейшие усилия в онлайн-лаборатории Multi-Cloud Platform Lab. моделирование потребует гораздо меньше

ресурсов. База данных регулярно обновляется, поэтому мы можем извлекать несколько сотен новых наборов входных данных каждые три месяца. Это меньше 10% от текущего размера базы данных, поэтому нам потребуется небольшая часть ресурсов для ее эффективной обработки. Также разработка новых алгоритмов построения моделей и выбора дескрипторов может быть протестирована на относительно небольшой части входных наборов и только для наиболее перспективных из них будут применены все входные данные. Важно отметить, что введение новых алгоритмов построения моделей может повторно использовать данные из предыдущих вызовов, что еще больше снижает потребность в больших вычислительных ресурсах.

**Ключевые слова.** Н-Аватар, Образование, Технологии, Моделирование.

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