Construction of Simulation Platform for College Students' Innovation and Entrepreneurship Courses Using Hyper-Converged Cloud Platform

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Abstract. In the era of "mass entrepreneurship and innovation", how to improve innovation and entrepreneurship education is one of the urgent problems to be solved. Therefore, the construction of high-quality simulation platform for innovation and entrepreneurship courses is the necessary foundation, urgent need and urgent task to carry out innovation and entrepreneurship education. Since innovation and entrepreneurship education involves the cross-integration of multiple courses with rich content and forms, the simulation platform for college students' innovation and entrepreneurship courses built by using simulation platform can integrate the training content of multiple courses and provide a practical simulation environment according to actual needs. The physical layer of the platform is five X86 servers, the network layer is two ten gigabit switches, the virtual layer is OpenStack, the data layer is computing center and data center, the resource scheduling layer is task resource scheduling, and the application layer provides specific application scenarios. The simulation platform of college students' innovation and entrepreneurship courses provides reference for the construction of relevant platforms.

Keywords: Hyper-converged · Innovation and entrepreneurship · Entrepreneurship and innovation courses · Teaching research · Education and teaching reform

1 Introduction

In the era of "mass entrepreneurship and innovation", innovation and entrepreneurship education is a powerful measure to promote local colleges and universities to develop in an application-oriented direction and serve the local. Therefore, the construction of high-quality innovation and entrepreneurship courses is a necessary foundation, urgent need and urgent task for the development of innovation and entrepreneurship education. How to construct innovation and entrepreneurship courses and cultivate the innovation and entrepreneurship ability of college students, the group with the most entrepreneurial

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potential, has been one of the most important and urgent topics in the development process of universities. As innovation and entrepreneurship education involves the cross-integration of multiple courses, the content and form are rich and diverse, and the data structure is also diverse, including structured, semi-structured and unstructured, which brings great challenges to the storage and management of course data. The current simulation platform teaching has the following problems: (1) The simulation platform updates slowly. Since most modules of the platform have been fixed when the platform is designed, it is impossible to update and eliminate some courses according to the update of knowledge, and recombine the courses, which makes the courses of most simulation platforms obsolete and not updated in time. This leads to a lack of interest among students. (2) It is difficult to integrate multiple curriculum systems. As there are different course systems of mass entrepreneurship and innovation for students from different directions, multiple simulation platforms have been built. These different simulation platforms require different managers, which increases the difficulty of management. (3) The interaction of the simulation platform is poor. Many simulation platforms are mechanically displaying and giving examples, lacking of interactivity. As a result, students can only operate according to fixed procedures, but lack the ability to deal with possible abnormal situations and teamwork. It is difficult to cultivate students' overall ability.

Based on the needs of entrepreneurship and innovation course management and the characteristics of diverse data, this paper analyses the scene needs of different students and builds a hyper-fusion cloud platform solution to realize practical simulation training of different scenarios for different students, in order to provide reference for peers.

2 Relevant Technology

According to the purpose and function of the simulation platform, its construction should mainly follow the three basic principles of usability, innovation and sustainability. (1) Usability refers to the development of corresponding modules according to the theoretical knowledge students have learned, which should be simple and easy to use. Students do not need to put a lot of energy on how to master the operation of the simulation platform, but ignore the exercise of practical ability. And in the setting of specific cases, we should not blindly pursue novelty, but separate from specific teaching theories, which can not make students' theoretical knowledge and practical training combined to maximize the cultivation of students' practical ability. (2) Innovation is required to give students a certain space for innovation, so that they can give play to their subjective initiative. The simulation platform should give students more opportunities to try and encourage them to make bold trial and error and explore the unknown space. (3) Sustainability requires the simulation platform to keep pace with The Times, especially the financial, tax and other policies, which are often changing. Then the simulation platform should give corresponding case examples or explanations for these changes. In this way, students can grasp the latest policy consultation in the first time, which is conducive to their innovation and entrepreneurship process, flexible use of policies, and provide convenience for their own enterprises.

The hyper-converged OpenStack cloud computing platform uses the distributed storage mechanism to reduce storage device overhead (Melo et al. 2018), which can save cost

for the construction of simulation platform. The hyper-converged architecture achieves efficient hardware integration, flexible resource scheduling, rapid system deployment, secure and reliable data, and unified service operation and maintenance (Zhang et al. 2021), which allows for rapid and flexible system deployment. The hyper-converged system consists of distributed video collection, hierarchical video storage and read/write load balancing (Qiang et al. 2020), which allows flexibility in building course video content.

The hyper-converged cloud platform adopts the open-source cloud computing solution OpenStack (Lima et al. 2019; Sahasrabudhe and Sonawani 2014), which has a modular architecture (Lima et al. 2019), can manage large pools of resources throughout the data center (Chi et al. 2018; Kai et al. 2020; Parakh et al. 2018; Sharma and Joshi 2016; Wang et al. 2022), including compute, storage, and network resources. Therefore, it is possible to build an entrepreneurship and innovation simulation platform for college students based on OpenStack.

3 System Design

3.1 The Architecture Design of the Platform

The simulation platform for innovation and entrepreneurship education adopts a six-layer architecture model (Fig. 1), including physical layer, network layer, virtual layer, data layer, resource scheduling layer and application layer. Physical layer provides basic physical facilities for innovation and entrepreneurship education simulation platform, which is the physical basis of the entire simulation platform. It has five SuperCloud servers, configured with two Intel 4-core Xeon E5 4607 V2 2.2G processors, 128G memory (32 GB *4 pieces, Samsung), two 2.5 “Intel 480G enterprise SSDs, two 2.5” Seagate 2 TB SATA hard drives. The network layer provides the distributed network and terminal access mechanism of the simulation platform, including one ten gigabit network adapter and one gigabit network adapter, which have load balancing, link aggregation and redundancy characteristics, and can effectively reduce network latency. Virtualization platform OpenStack is deployed at the virtual layer, providing virtual resources for the entire innovation and entrepreneurship education simulation platform, including server virtualization, storage virtualization, and network virtualization. The data layer provides data storage and calculation for the innovation and entrepreneurship education simulation platform. Data storage includes data management, data cable, and data computing includes streaming computing, real-time computing. Resource scheduling layer provides task scheduling, resource scheduling and load balancing for innovation and entrepreneurship education simulation platform. The application layer is divided into several functional modules and basic functional modules according to the course system, including finance and taxation module, human resources module, etc., which is designed directly for end users and provides multi-terminal access platform, such as desktop end, mobile device end (including VR system device and mobile device), Web end, etc. It provides a cross-platform teaching simulation and intelligent decision-making platform for end users, which can realize the simulation and teaching effect evaluation and scoring functions of multiple scenarios, such as finance and tax scenarios and human resource

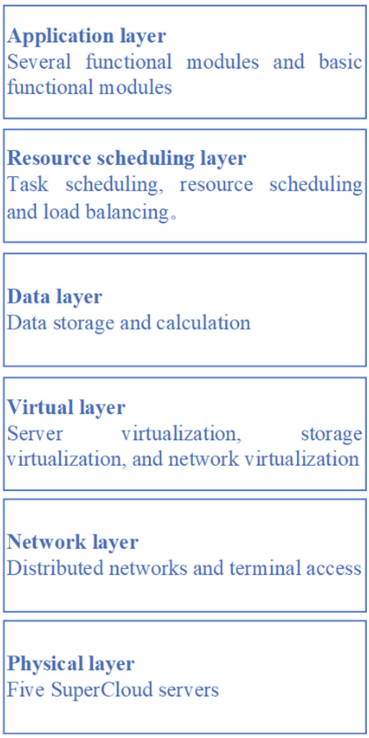

Fig. 1. Architecture of innovation and entrepreneurship education simulation platform

management scenarios, so as to provide corresponding data support and decision support for the teaching results research of simulation and teaching platform.

3.2 The Functional Design of the Platform

Under the existing platform architecture and computing resources, the system mainly includes course video module, simulation scene sandbox module, teaching evaluation module. The course video module encapsulates pre-recorded video lessons for students to learn. The sandbox module encapsulates several virtual scenes, where students can play roles and get close to actual combat. The teaching evaluation module encapsulates the algorithm of evaluating students' behavior, which is used to evaluate students' real-time learning status, and gives the results to the teacher. Teachers can modify their teaching behavior according to the evaluation results. The simulation platform for innovation and entrepreneurship education can combine courses through task invocation, and construct different course modules for students of different grades according to the school's curriculum arrangement and students' demand for innovation and entrepreneurship. For freshmen, it mainly focuses on training of innovative and entrepreneurial thinking, and scene projects mainly focus on effective team communication and abstracting problems from reality, so as to cultivate students' understanding and interest in innovation and entrepreneurship. For sophomores, basic financial and tax knowledge and

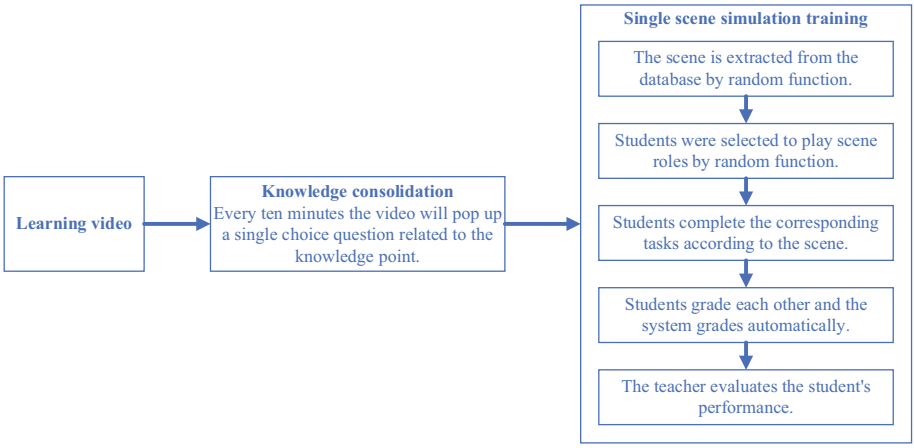

Fig. 2. Learning process for junior students

human resource management methods will be explained, and corresponding scenarios will be simulated. For junior students, on the premise of mastering all kinds of knowledge, they will try to integrate knowledge, conduct initial training of maker team, and participate in innovation and entrepreneurship competitions (Fig. 2). The innovation and entrepreneurship course simulation platform provides on-site scene simulation of the competition process, so that junior students can adapt to the environment of innovation and entrepreneurship competition faster. After all kinds of practical training, senior students build their own environment according to their own needs on the virtual resources provided by the innovation and entrepreneurship education simulation platform for practice.

4 Conclusion

The simulation platform for college students' innovation and entrepreneurship courses built on the basis of ultra-integrated cloud platform technology can cultivate students' innovative thinking and enhance their innovation and entrepreneurship ability. The ultra-integrated cloud platform technology can provide a reliable and stable system architecture for the innovation and entrepreneurship course simulation platform, and can dispatch resources to build virtual scenarios according to actual needs.

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