

Integration Of Student System Using iPaaS

Srimathi H, Krishnamoorthy A

Abstract: Higher Education sector in India is witnessing massive and exponential growth in terms of number of students and institutions. The procedures associated with the academic processes such as admission, teaching, examination and support services have also grown manifold. The institutions make use of Enterprise Resource Planning (ERP) in student information and for organization activities. The various autonomous and heterogeneous applications of ERP system with traditional approach do not address the issues related the scope of on-premise and cloud integration. This resulted replication of data entry, manual data processing, inconsistency and time consumption. The invention proposes the integration of Student System (ISS) using Integration Platform as a Service (iPaaS), which aims to deal with hybrid era of cloud and on-premise applications.

Index Terms: Student System, ERP, iPaaS, API, ESB

1 INTRODUCTION

The advent of information technology demands refreshing challenges in higher education to offer student services (Pollock et. al, 2014), as listed below. The institutions incorporated electronic communication process for any kind of communication, upload the same on website and sends through email. The admission process, counseling, course registration, fee payment, student support services, attendance maintenance, exam result announcement and etc., are made online using Enterprise Resource Planning (ERP). Institutions also make use of Customer Relationship Management (CRM) for student recruitment and query responses to meet expectation of stakeholders. Learning Management System (LMS) is used as effective tool for teaching learning process. The Massive Open Online Courses (MOOC) is also utilized as valuable learning resources apart from institution own proprietary LMS. The institutions make use of social, mobile and cloud technologies on top of on-premise applications to meet the expectations of young-millennial students. The student information system (SIS) of higher educational institution has periodic data updates and exchange based on the academic process and activities. Despite the rapid progress in technology, the institutions still make use of manual processes for 'behind the scenes' work in student services. Apart from such disintegrated system services within institution, CRM and LMS; there is no proven student data exchange exists with external applications like MOOC and University ERP. This necessitated the need of present invention to suite for enterprise-wide integration among multiple modules / applications / platforms / locations and enterprises. The invention is further motivated by the growing amount of Government initiatives with Digital India movement and technological implementation in higher education to serve students of digital era.

2 IPAAS

The iPaaS comprise of set of automated tool, which helps in connecting software from different environment and deployment (TIBCO, 2018). It is mainly used in complex and large business where there is a challenge in cloud integration of data and applications. It supports multi-tenant architecture

which benefits our student support system (Dell Boomi, 2018). The enterprise integration standards followed in iPaaS simplifies the application integration. The collective data aggregation and distributed run-time engine with centralized management ease application & data maintenance and assure secured data / application exchange (Benoit et. al, 2015). The simplified iPaaS architecture overview (Wipro, 2018) is given in Fig. 1.

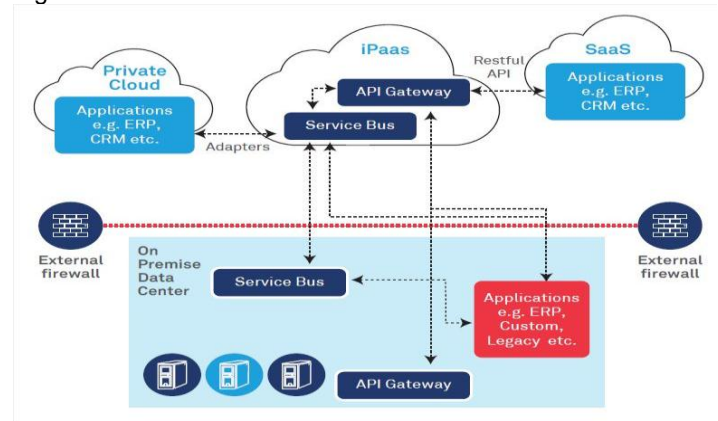


Fig. 1. iPaaS Architecture (Source : Wipro, 2018)

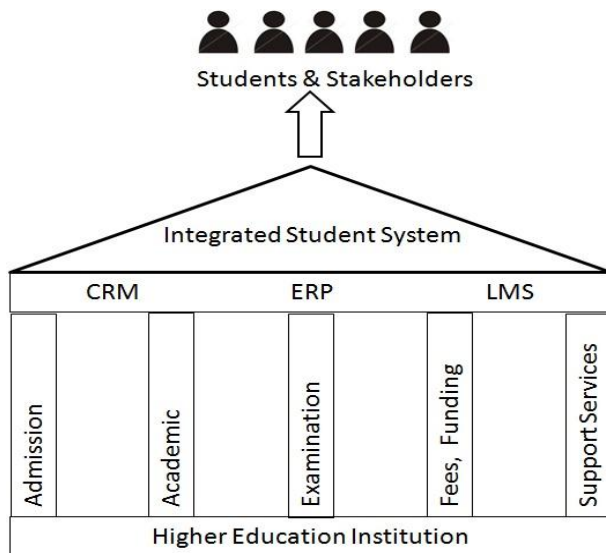
3 OBJECTIVE

The study investigates plan of action and implementation in rapid hybrid integration of the student information and support services with the following objectives: Design an academic and administrative interconnected system which streamline data and functional integration Automate process workflow, improve information access and secured data sharing Ease online submission, ensure seamless transaction and reduce the redundancy Limit / replace manual and paper based work, avoid errors and delayed process Improve the student experience and satisfaction

4 IMPLEMENTATION

The higher education institutions are expected to do deliver integrated services to its stakeholders especially student community as shown in Fig. 2. Though the technology is used extensively, the academic and administrative systems exist either in isolation or with limited data sharing. But for better decision making and student success, it is important to develop seamless integration among modules and applications over cloud (Almajalid, 2017).

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decision. The grades obtained in semester abroad program to be further integrated with institution and university ERP for deriving course equivalence.

Fig. 2. The domain of higher education student services

The student specific services of higher education institutions are detailed in Fig. 3. The institution ERP has several modules and interaction within (Ellucian, 2016). The tightly-coupled subsystem permits data sharing / reference. and external applications. In addition, the important integration flows are captured with color coding. Some of the listed modules of institution ERP like admission process, finance, transport, hostel and library may also be deployed as separate applications. In such cases, the data / application flow must ensure required interoperability. The features of student information system in the given diagram are listed as follows: The DigiLocker facility of Government is used in referring student grade sheet of qualifying examination during admission. The university is recommended to publish the degree certificate in DigiLocker. This helps the employer to do authenticate certificate verification. The data of prospective candidate will be transferred to student database only when the candidates complete enrollment. The history card module serves as single sign-on dashboard through which student can access other interrelated applications / modules. The parents are given limited view option in student data. CRM is used to qualify the leads for application conversion. It is also used in stakeholder communication to access relevant student information. The LMS is used either as blended or online learning. The challenge is on assessing the learning outcomes through external learning resources especially through MOOC. The study recommends the institution to establish agreement on MOOC platforms which are approved for university grading to access the student grades. The grades obtained by students in end-semester result serve as valuable inputs in student life cycle. The course registration, mentoring, coaching, value addition, semester abroad and placement are some of the modules, where the decision is based on student performance in examination. The students of institution have unique login id in university ERP to do exam enrollment and view result publication. However, there is a lack of integration between institution and university ERP. The institutions perform either data entry on university system or manual data sharing of internal assessment and attendance details of students due to limited integration. Similarly, the institutions are expected to manual process on examination results in the form of documents, to analyse the performance and further

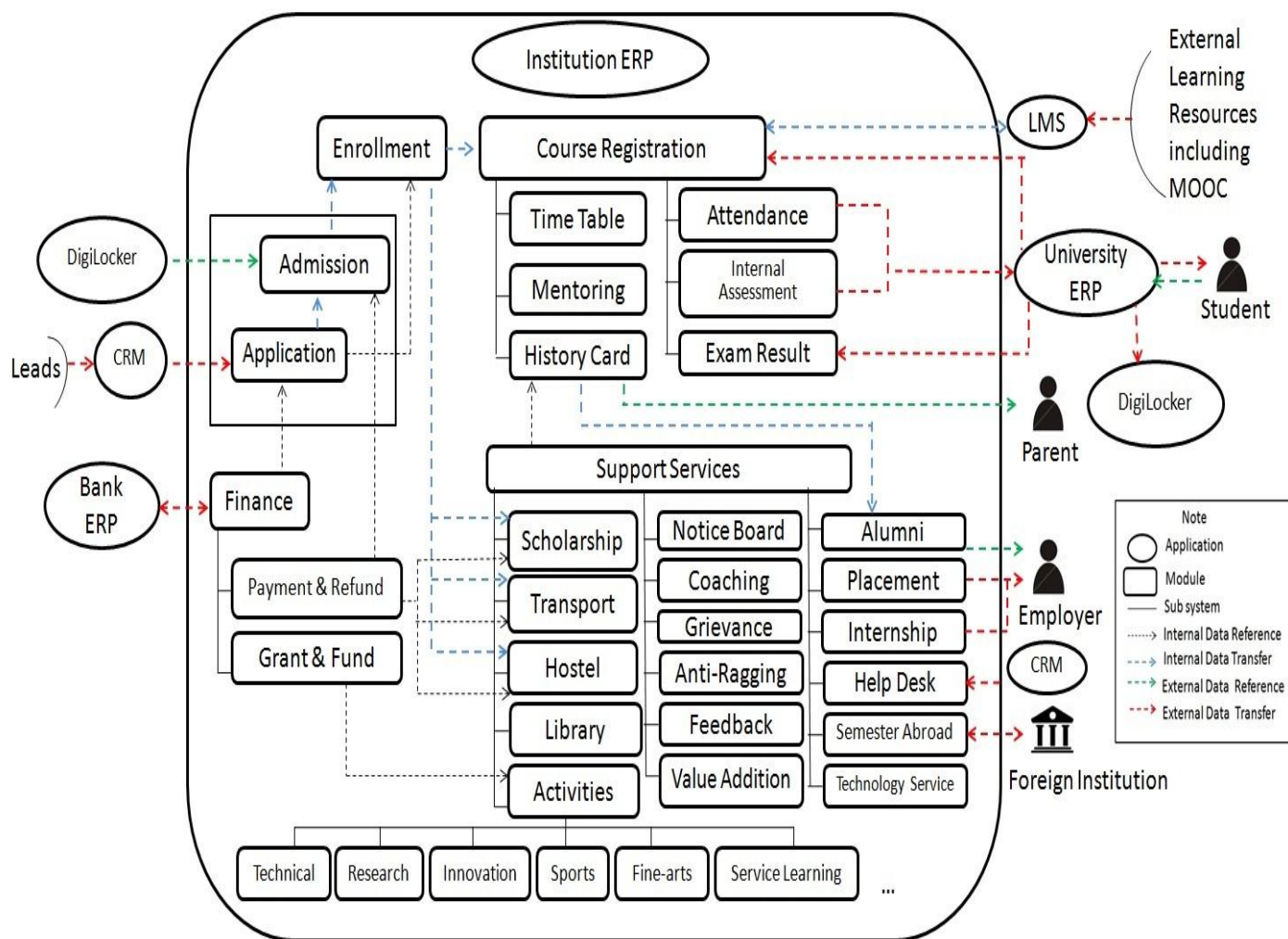


Fig. 3. The connectivity and data flow of student system

With the given complex modular structure, it is imperative that the modules and applications of student information can no longer be run on limited integration and manual information sharing. The student information system can be an effective tool only when it is integrated and established with proper dependency chaining workflow. The hybrid model of student system poses unique challenges on data population, access provision, data consistency and optimizes business process (Benoit et. al, 2015). The earlier point-to-point Application programming interface (API) integration and Enterprise Service Bus (ESB) integration are limited to native integration and not scalable. Using ESB, it is difficult to intersect metadata and object-level understanding, expects to deploy custom code and used to access legacy endpoints, if they are already wired. Further, the integration tool must combine multiple platforms, applications; ensure scalable and dynamic integration with quick response time. As a result, higher education institutions are seeking optimum integration strategy. The proposed ISS using iPaaS as given in Fig. 4 manages the entire activities of students in highly secured and resilient manner. The iPaaS is built to address technology inconsistencies faced by API and ESB to integrate enterprise-wide applications without any alteration (Wipro, 2018). The iPaaS has the capability to manage the entire API life cycle on secure platform. The iPaaS resolves difficulty faced in meta data intersection, object-level understanding, custom code to

access legacy endpoints in ESB as it is specially designed for hybrid agile environment with ubiquitous access of cloud, mobile and Internet of Things (IoT) (Informatica, 2019). The iPaaS assures to shift the on-premise applications and data to cloud environment without any additional re-design on integration flow. The iPaaS helps in connecting both existing and new application module interfaces without any modification.

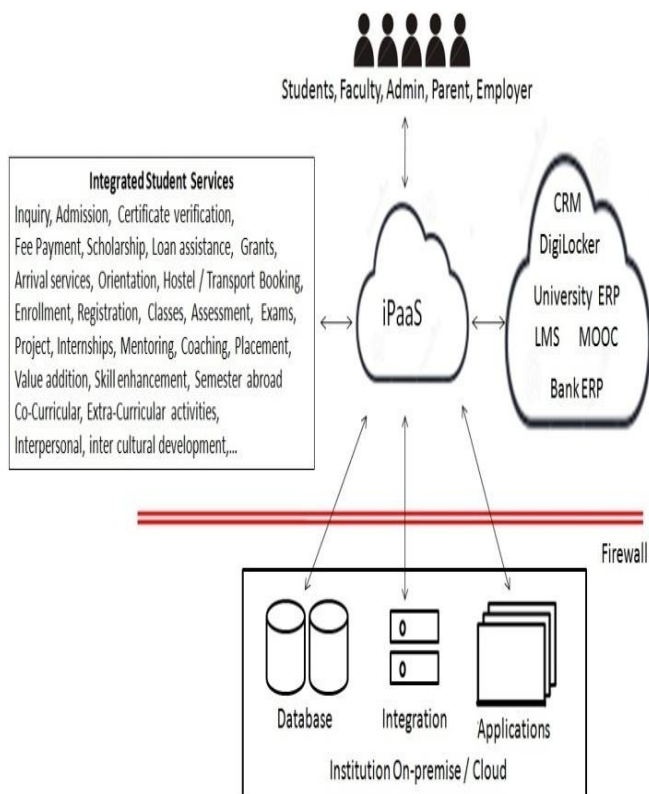


Fig. 4. Integrated Student System using iPaaS

The hybrid integration workflow settings of iPaaS are described in Fig. 5 since the data is critical, flow between system and cloud based (Arora, 2017). The application connectors and product specific adapters are still permitted to integrate within on-premise application. The flexibility is ensured through semantic and structural validation, transformations in terms of ERP version updates. The iPaaS dashboard enables to manage the integration settings, connect data from multiple systems and consolidate into a single platform (Thoo et al, 2019). The unique structure of iPaaS provides secure proxy communication and governance protocol. Apart from the data standards of electronic data exchange, the Learning Information Service (LIS) standard is established between LMS and ERP. Few iPaaS providers are bundled with pre-packaged integration points and development toolkit.

5 BENEFITS

The integrated system has data flows back and forth with consistent and updated information. This supports synchronization among CRM, Bank / Institution / University ERP, LMS and MOOC. This helps reduction in administrative tasks, improve data analysis and decision making. The integrated system benefits to fetch information of student from various platforms, modules and application, analyze and present in a holistic manner to students, faculty, parents and other stakeholders. With this, the stakeholders found Easy to identify students' basic traits, academic excellence and other achievements. It helps to alert advisors on the type of student activities, suggest the personalized learning path, map The teaching-learning process is fine-tuned based on collective feedback and student performance The financial decision is ease with respect to filter eligible scholarship candidates,

accounts reconciliation and speed-up the refund process. The invention assures secured data communication between institution and university ERP. Considering the number of affiliated institutions under each university, the implementation reduces huge replicated data entry work and manual data processing. This enables to speed up the response time and ensures professional experience. The integration approach can be extended to entire university / institution system to manage student, staff, faculty information and other administrative modules

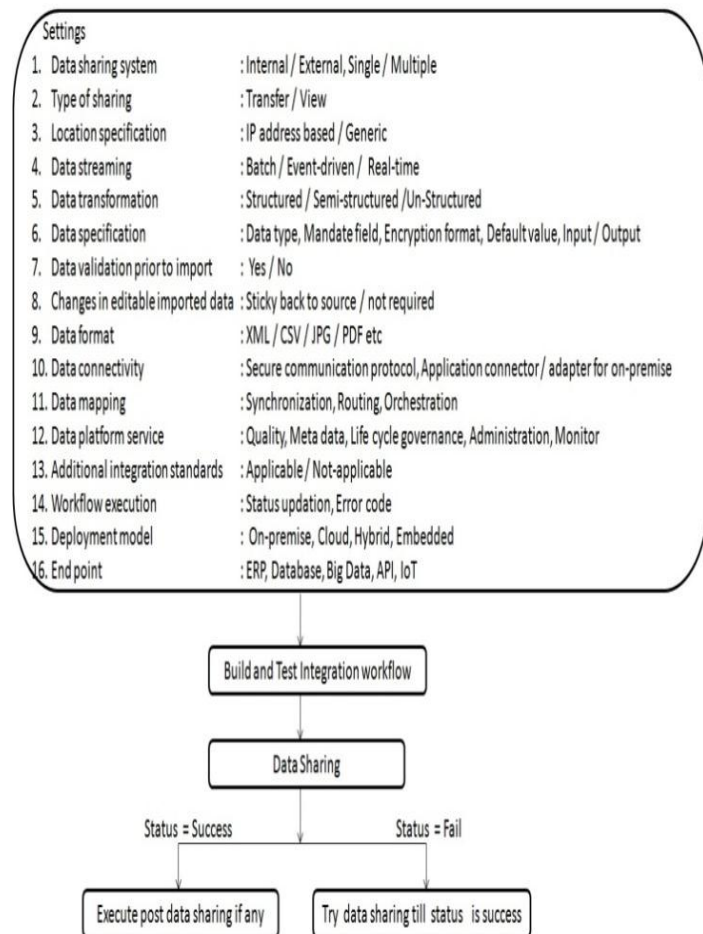


Fig. 5. iPaaS setting for integration

6 CONCLUSION

The rapid digital expansion of higher education institution insists system integrity as one of the major concerns. The iPaaS for generic applications exist for longer time; however the utilization of iPaaS in higher education is emerging. The invention of ISS helps the higher education institutions to expand their student services on ubiquitous cloud and achieve seamless integration without customization of back office process in existing ERP, CRM and LMS applications. Further, the institutions take full advantage of timely integration of real time student data. The unified iPaaS offers connected applications of student information system, eliminate manual process, strengthen decision making, simplify data analysis, reduce administrative paper work and save significant time.

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