

# Integrating Oracle ERP Into Business Curricula: Challenges And Measurement Of Student Outcomes

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## Abstract

*Recent research has pointed out the need for academia to provide business students with core competencies higher on the value chain. This has motivated schools to consider their curriculum in light of these increasing demands, and many schools are responding by incorporating ERP packages into their curriculum. This paper describes the experiences of two universities in integrating Oracle ERP into business curricula. Challenges are outlined as well as results of a student survey, which suggest that while students perceive Oracle's ERP system to be complex and difficult to use, overall they believed it helped them better understand business processes and key concepts in enterprise systems theory.*

## 1. Introduction

The recent monograph, *Accounting Education: Charting the Course through a Perilous Future* (Albrecht and Sack, 2000), contends that while accounting organizations, such as the IMA and the AICPA, have made positive steps towards responding to the rapidly changing global and technology-intensive economy, accounting education has been slow to respond. Albrecht and Sack (2000) blame this on education's lack of agility due to universities' hierarchy of departmental and college curriculum committees, university administrators, and boards of regents. For accounting programs, this hierarchy is further compounded by the requirements of state regulatory agencies and CPA exam eligibility. The bureaucracy involved in making changes to curricula has severely hindered academia from keeping pace with the New Economy.

According to Barry Melancon (1998), the CPA of the future will have a much broader information base and will be quicker to respond to fluid business conditions. CPAs are moving up the value chain from merely recording information to translating information into critical knowledge and using it to anticipate and create opportunities for their clients. However, Albrecht and Sack (2000) note that today's university students do not have a thorough understanding of technology's impact on business; nor are they cognizant of how technology can be leveraged to make business decisions. Furthermore, business curricula have failed to exploit technology and impart to students how technology is reshaping the world.

This paper describes the efforts of two institutions, The University of Akron and Bryant College, to integrate technology, specifically enterprise resource planning (ERP) systems, into business curricula. One of the major goals of both schools in the adoption of ERP was to encourage students to think outside of traditional financial reporting and information recording towards more of a process orientation to business, with accounting as just one subset of the value-creating business. The authors believe that by integrating ERP into business, students gain insight into the steps that different functional units take towards supporting a process, thus better understanding the cross-functional nature of business. Additionally, by integrating ERP theory and hands-on experience with an ERP application into business curricula, certain key concepts of systems theory are better understood by students. The following section outlines these proposed benefits.

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*Readers with comments or questions are encouraged to contact the authors via email.*

## **2. Benefits of ERP Integration into Business Curricula**

One of the most obvious benefits to introducing ERP into business curricula is to expose students to how business processes extend across the organization and the organization's value chain. Generally, students think in terms of how their subject area (e.g., accounting) affects business, to the detriment of grasping the entire picture of what makes a company work. Students need to gain a broad picture of the strategic goals of a company and the processes that support these goals. However, merely lecturing students on process cross-functionality without demonstrating real-world manifestations of this functionality via information technology does not drive the point across as well.

A benefit of integrating ERP into accounting curricula relates to the content areas of auditing and accounting information systems (AIS). In both bodies of knowledge, students are exposed to general and application controls. Instead of focusing on general controls such as grandfather-father-son tape backups, or header labels and trailer labels, students will see state-of-the-art security measures used by many of the largest companies in the world. Furthermore, classroom discussions of general controls, such as disaster recovery, user rights to applications, and sign-on procedures can be easily explained by demonstration of an ERP system. ERP systems can be used to demonstrate edit checks (a type of application control). Included in edit checks are completeness, field, range check, etc. These can also be shown to students, providing a real world example of these types of controls.

Over the last few years, the popular press has been saturated with accounts of ERP implementations, both successful and unsuccessful. Factors leading to the successful implementation of these systems have been the focal point of many research studies and practitioner articles. Students should be aware of the problems firms experience as they undertake a major enterprise software implementation and how, as a business professional, consultant, or accountant, they can help minimize threats to successful projects. An understanding of ERP theory and gaining hands-on experience with an ERP package can help students understand how and why organizations have such difficulty during implementation. Among many reasons, these difficulties stem from the significant changes to business processes to match best practices of the software, reconfiguring lines of codes, and the inherent complexity of the applications.

Hands-on experience with an ERP system will also help students understand the concepts of best practices and reengineering. Two types of reengineering exist – clean slate and technology-enabled (O'Leary, 2000). Implementing best practices embedded in ERP systems translates into technology-enabled reengineering, which is a more controlled method to reengineering. These concepts are taught in information systems courses, and showing students software best practices can help them grasp the concepts of these two facets of reengineering.

User training on an ERP package is one of the hidden costs of an implementation, usually costing much more than anticipated in the budget and taking far longer than expected (O'Leary, 2000). Without an understanding of the complexity of the software and the many levels to which users can "drill down" within the software, training and managing user resistance to change are concepts students may not completely appreciate.

## **3. The ERP Selection Process**

The leading ERP vendors are known by the acronym JBOPS, which stands for J.D. Edwards, Baan, Oracle, Peoplesoft, and SAP. Recently, many of the larger ERP vendors have initiated Academic Alliance Programs, in which universities become members for a nominal fee and receive the software for academic use. SAP's rather aggressive marketing strategy and dominant market share position in the corporate world led to the first ERP implementers in the academe. Initially, ERP vendors picked a handful of schools to serve as focus groups for their Academic Alliance programs. Over the past few years, with the maturation of ERP technology, other ERP vendors have made notable inroads into the SAP-led competition, and smaller schools are joining these alliance programs.

To meet the objective of integrating ERP into the undergraduate and graduate business curriculum, The University of Akron's Associate Dean formed a committee consisting of systems faculty from Management, Accounting, and other departments interested in using an ERP package in their course(s). The committee's broad goals were to select an appropriate ERP package and develop a plan to integrate it into the business curricula. Tasks set forth for the Committee were:

1. Evaluate ERP packages from vendors that had an academic initiative program.
2. Choose an ERP package.
3. Identify the hardware necessary to run the selected ERP system.
4. Hire a lab director who could help install and maintain the ERP system.
5. Determine faculty training needs.

Major considerations for the selection of an ERP system were:

1. Cost of software.
2. Hardware needs.
3. Ease of use.
4. Cost of training faculty.
5. Ease of integration into curriculum.

Because SAP and Oracle were deemed to have strong alliance programs, the Committee contacted these two vendors and requested that they make a formal presentation at The University of Akron. Since the University uses Peoplesoft as their information system, the Committee was encouraged to consider this ERP system as well. After the demonstration of all three applications, the Committee engaged in a lengthy discussion regarding the strengths and weaknesses of each system. Initially there was a split among the Committee members, but in the end Oracle 11i E-Business Suite was chosen. The following points entered into the discussion regarding the relative merits of Oracle 11i versus the competitors:

1. Oracle 8i database was already being used in Database course(s). Additionally there were plans to use Oracle Designer and Developer in Systems Analysis and Design classes.
2. Oracle 11i was web-based. This would enable students to access it from outside school.
3. Oracle has a broad product line including database, case tools, data mining tools, and E-business suite. SAP and Peoplesoft solutions did not have all these offerings.
4. More companies in northeast Ohio used Oracle as compared to SAP. Students with Oracle skills would find it easier to find jobs in the area.
5. More expertise was available for Oracle compared to SAP in the northeast Ohio area.
6. Some of the Committee members had heard “horror stories” about SAP from other schools that had adopted it. The problems stemmed from massive hardware requirements and difficulty of using the software.
7. Service and support from Oracle Corporation was not considered to be as good as SAP.
8. SAP’s Academic Alliance was better organized than Oracle. SAP made every effort to help the universities in terms of installation and course materials.
9. University of Akron had just introduced a graduate E-business certificate program and an MBA with an E-business concentration. The thought was that Oracle would be a better fit because of their E-business suite.
10. The cost of all three packages was very similar. A membership for Oracle’s database tools costs \$500; a membership for the E-Business Suite costs \$3,000 or \$10,000 depending on the level of support and training desired.

The decision to adopt an ERP package at Bryant College was not made by representatives from various departments, but by AIS faculty members. The package was initially intended for a new special topics course, ERP and Other Application Solutions for the New Economy. The decision to adopt Oracle’s E-Business Suite was predicated on the desire to develop synergies between the AIS and computer information systems (CIS) departments. Like The University of Akron, Oracle 8i was being used in several courses in the CIS area. J.D. Edward’s OneWorld was also considered, but discussions with their university relations personnel revealed that the company had suspended adding any more schools to its alliance program because of recent staff reductions. Also, Bryant AIS professors had heard about SAP “horror stories”, and Bryant was also in the process of launching an E-Strategy concentration. In light of these issues, Oracle seemed to be the best choice at Bryant College.

#### **4. Hardware Configuration**

For the ERP initiative, The University of Akron purchased a new server. Oracle 11i runs on Windows 2000 Advanced Server SP2 using Dell Power Edge 6400, Pentium III-Quad with a 700MHZ processor and 4GB RAM memory. The University has Service Pack Release 3 version of Oracle 11i.

Previous attempts to run on Windows NT at Bryant College were unsuccessful, mostly because of inadequate hardware, not necessarily the operating system. After discussions with several representatives from Oracle, it was determined that Oracle 11i would run best on UNIX. Bryant purchased a Sun Enterprise 450 at a cost of \$35,000. The system has four CPUs with 480 megahertz and four gigabytes of memory.

#### **5. Implementation**

Ideally, an experienced in-house information systems staff would go a long way in mitigating most ERP implementation issues. However, such staff is not only expensive, but also hard to find in light of current market demand. Furthermore, the reality is that Oracle does not offer any guidance for implementing their product. After joining the Oracle Academic Initiative (OAI) and paying \$3,000 or \$10,000 for a membership, schools must rely on their own expertise or hire an independent consultant (at a current market rate of \$2000/day) to implement the package.

To implement Oracle, The University of Akron hired a Director of Technology. Since no Oracle expertise existed within Bryant's IT support staff, Bryant chose to outsource the installation and initial debugging of the program. Through contacts with MBA students that worked at large corporations, the faculty member who taught the ERP class found an Oracle Database Administrator (DBA), who was willing to contract on an hourly basis (at a rate of \$90/hour). The initial installation took three weeks. After implementation, it was discovered that the Order Management module of Oracle 11i release adopted was wrought with bugs that required "patching" of the software. Since the Order Management module is crucial for demonstration of the order-to-cash process, Bryant College contracted the DBA for the patching. This process took another several weeks, and when completed, the DBA demonstrated a simple order to cash flow, which appeared to work fine. However, during the labs, the Order Management module repeatedly displayed errors, which could not be debugged. In the middle of the semester, the consultant terminated his agreement with Bryant College vis-à-vis the faculty member, leaving a myriad of technical problems. As no formal contract was drawn up, the faculty member was on her own for the last month of fall semester 2001. Attempts to get help from OAI were, for the most part, fruitless.

#### **6. Training and Support**

Because of the complexity of any ERP system, training is an essential component that can either make or break the success of the initiative. The graphical user interface for Oracle 11i is not known for being user friendly or intuitive. Likewise, the Help feature within Oracle is skeletal and does not include search functions.

Presently, Oracle offers two types of training programs. As a member of OAI, faculty are eligible for 50 percent off of technology-based training (TBT) CDs and/or 50 percent off of Oracle training classes, which are offered in various cities and at various times. An average OAI price for a TBT is \$700. The TBT CDs are structured, including information text, multiple choice/true false questions, and short demonstrations of the software. As of August 2001, the semester both schools began using Oracle in classes, TBTs were not available for version 11i. Therefore, Oracle 11 TBTs were purchased. This caused a bit of confusion as some information, screen shots, and module names (e.g. Order Management is called Order Entry in Oracle 11) were different between the two versions. The average OAI price for a five-day class at an Oracle training site is \$2,000. In addition to these training options, schools can hire an Oracle consultant at a cost of \$2000 a day to train faculty. This rate is exorbitant for most universities, however, if a proper need-based training is available that matches with the requirements of the institution, then it can be quite helpful.

At The University of Akron and Bryant College, the use of TBTs was the chosen training solution for cost reasons. However, at Bryant College the consultant who implemented Oracle also spent several hours training the AIS faculty member on Order Management and Oracle Payables.

Oracle support is available both on-line and over the phone. However, our experience has been that the support has been rather inadequate, as universities do not classify as revenue centers in Oracle's dynamics. The Oracle web site, Metalink, is fairly useful as a message board for posting questions and finding answers. However, most of the discussion forums and threads are so technical that Metalink has limited value for academicians.

## **7. Teaching with Oracle**

Clearly, the most impressive use of an ERP system at the college level would be to get buy-in from all business departments. Since ERP extends across functional boundaries, it should ideally extend across academic units within a university or college. However, neither The University of Akron nor Bryant College has been successful in launching Oracle on this level of magnitude thus far. Currently there is no consensus on the best method for integrating an ERP package into the business curriculum. Therefore, most schools develop their own methods with limited knowledge sharing among faculty.

At The University of Akron, the ERP course was offered in Accounting and Management departments simultaneously in the first semester. In Accounting, the ERP course was offered both at the graduate and undergraduate level, whereas in Management the course was offered only at the undergraduate level. Oracle Financials and Human Resources (HR) modules were the only modules introduced. The AIS and MIS faculty developed several lessons in HR, General Ledger, and Purchasing and introduced those modules to students.

At Bryant College, an AIS faculty member has been successful in integrating Oracle 11i in two graduate-level classes, Accounting Systems Analysis and Design and ERP and Other Application Solutions for the New Economy. Oracle Financials was the main module introduced to students. Technology-based training was made available on both course web sites (each application cut and pasted into PowerPoint slides). Students completed the multiple choice/true false within each lesson and turned in for grading. Also, short tutorials were written for several applications within the Financials module (i.e., Order Management, Receivables, and Payables). These tutorials had limited value, however, as students encountered a plethora of errors that the faculty member could not replicate and which were not encountered during the initial development of the labs. Lastly, students completed a group project, which consisted of documenting two events within a business process (e.g. hiring an employee, paying an employee). This project was completed at the end of the semester, and students presented their project in class.

## **8. Challenges Ahead**

Both The University of Akron and Bryant College faculty, who integrated Oracle in their classes, note the following challenges ahead for other faculty undertaking this initiative. The schools mentioned in this paper have overcome some of these obstacles, however many still remain. Among these challenges are:

1. Little help from Oracle. It appears that Oracle has launched an academic initiative for the sole purpose of keeping up with initiatives begun by their competitors. Offering no support, training materials, or pedagogy for their system, Oracle has failed to follow through with their higher education program. There does not seem to be a central person at Oracle to manage this program, nor does there seem to be an infrastructure to support its diffusion across colleges and universities.
2. Lack of adequate budget for training faculty.
3. Lack of good training materials.
4. Lack of course development grants.
5. Steep learning curve for faculty and students.
6. Lack of interest among non-IS faculty to integrate ERP in their course(s).
7. Difficulty in integrating throughout the business school curriculum (no proven methods).
8. Budget issues, reward/performance, resistance to change.
9. Lack of strong administration support (vision). In one school, the administration had no idea what an ERP system was. Therefore, it was difficult for them to grasp the vision of how the tool could be used throughout the business school.
10. Lack of financial resources for hardware, training, and support.
11. The need for an ERP administrator. This may never materialize unless ERP gets disseminated across departments, which will entail colleagues in other disciplines becoming champions as well.

12. Faculty must develop coursework focusing on core business processes, rather than along functional areas (Becerra-Fernandez, et. al. 2000). This may not be easy to do as the curriculum at many schools is very rigid and departments do not want to change anything, especially in the MBA curriculum.
13. Lack of internal technical help.
14. It appears that very few schools use Oracle E-Business Suite on the level of University of Akron and Bryant College. Therefore, there is no exchanging of ideas among schools or help with technical issues.
15. Incentives to faculty for the time and effort.
16. Need to decide if it is worth it to become a first mover on a particular version of ERP. Usually these versions (e.g., Oracle 11i) are riddled with bugs and patching is necessary.
17. Obviously the same issues organizations experienced regarding adopting a single source ERP solution, or adopting one at all, has been mirrored in academia. Even now at Bryant College, the CIS department has seen the issues the AIS faculty has had regarding installation and subsequent support of 11i and has raised the possibility of outsourcing ERP to SAP. While embarking on yet another ERP initiative is not seen as an attractive solution to Accounting, the thought of eventually outsourcing maintenance of Oracle is under consideration. The downside to outsourcing maintenance of an ERP system is that the university never undergoes organizational learning with respect to these products. However, with the difficulties in obtaining budget approval for new positions, outsourcing might be the most expedient and less costly alternative.

**9. Student Feedback**

The authors of this paper developed a survey to ascertain whether integrating Oracle ERP into curriculum met any of our intended goals. Also, we wanted to gain a perspective of how difficult it was for students to navigate and learn various applications of the ERP package. First, students were asked to rate ease of navigation, user friendliness, on-line help, and complexity of the software using a Likert scale with endpoints of 1 to 5, with (1) being Very unsatisfied and (5) being Very satisfied. Table 1 displays the means, frequencies and percentages for each item based on 74 responses. Where frequency or percent do not sum to 100 or 100% respectively, this is due to missing or invalid data.

<b>Table 1</b>								
	Navigate Mean = 3.15		User Friendliness Mean = 2.78		On-line Help Mean = 2.96		Complexity Mean = 2.92	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
1= Very unsatisfied	6	8.1	13	17.6	15	21.1	10	13.5
2 = Moderately unsatisfied	16	21.6	18	24.3	14	19.7	16	21.6
3 = Neutral	19	25.7	21	28.4	15	21.1	23	31.1
4 = Moderately satisfied	27	36.5	16	21.6	18	25.4	20	27.0
5 = Very satisfied	6	8.1	6	8.1	9	12.7	5	6.8

Overall, Oracle did not rate well with students. The means were relatively low, with student perceptions of Oracle’s user friendliness, on-line help, and complexity having means of less than three. The highest mean was satisfaction with the navigation of the system (3.15). Forty-five percent of students were satisfied with the navigation of Oracle, while 30% were not. This compares to roughly 30% of students being satisfied with user friendliness, on-line help, and complexity of Oracle versus 40% that were not. Clearly, with more exposure to Oracle, the means should increase; however, one aspect that will not increase with more exposure is on-line help, which is below average compared to other packages the authors have evaluated. According to one student, “Oracle 11i is not user friendly at all. I found it very hard to navigate and understand the flow of information. The online help is extremely unhelpful. The Oracle help is significantly less robust than what is available for Microsoft Office products, for example. This weakness should be addressed by Oracle and improved.”

Next, students were asked how effective Oracle was in helping them understand key concepts (knowledge the authors hoped integrating an ERP system into curriculum would afford). Table 2 shows the means and percentages for each concept.

**Table 2**

	Business Processes Mean = 3.21		Employee Training Mean = 4.31		Reengineering Mean = 3.26		Change Management Mean = 3.23	
	Frequency	Per- cent	Frequency	Per- cent	Frequency	Per- cent	Frequency	Per- cent
1 = Very unsatisfied	6	8.2	1	1.4	6	8.1	7	9.5
2 = Moderately unsatisfied	13	17.8	3	4.1	9	12.2	10	13.5
3 = Neutral	19	26.1	9	12.2	26	35.1	25	33.8
4 = Moderately satisfied	30	41.1	20	27.0	26	35.1	24	32.4
5 = Very satisfied	5	6.8	41	55.3	7	9.5	7	9.5

Forty-eight percent of students expressed satisfaction with the use of Oracle in helping them better understand business processes, as opposed to 26% of students expressing dissatisfaction. As stated by one student, “The use of Oracle 11i, although frustrating at times, was beneficial, particularly in understanding the importance of well-defined business processes and the importance of understanding an organization’s operational strategy requirements for successful implementation of an ERP system.” Eighty-two percent of students thought they better understood the importance of proper training for ERP as opposed to 5% of student believing that using Oracle did not help them understand this concept. States one student, “Our experiences with Oracle definitely made it clear why training is so important with ERP systems.” Forty-five percent of students thought that hands-on experience with Oracle helped them grasp the concept of reengineering to best practices as opposed to 20% who did not. States one student, “It [Oracle] brought home how important reengineering is when implementing an ERP system. Companies must make changes to the way they do business.” Forty-two percent of students learned more about change management by hands-on experience with Oracle as compared to 21% that did not. States one student, “Oracle was extremely useful in exemplifying the amount of organizational change that may be required to implement an ERP system. However, maybe change management wouldn’t be such a huge deal if the ERP application were more user-friendly.”

Based on student responses (see Table 3), the mean for Oracle’s contribution to their understanding of the importance of top management support for ERP was 3.37. Fifty-one percent were satisfied while 26% of students were not satisfied. Fifty-four percent of students had a better understanding of security issues by using Oracle in the classroom while 22% did not. Security mechanisms, such as user responsibilities, audit logs, and field checks were pointed out to students. Many more security mechanisms can also be demonstrated to students. Both the planning process and data integration concepts had high means (3.99 and 4.04 respectively). Seventy-three percent of students had a better understanding of planning for ERP while 11% did not. Likewise, 74% of students grasped the concept of data integration better while 8% did not.

**Table 3**

	Top Mgmt Support Mean = 3.37		Security Issues Mean = 3.49		Importance of Planning for ERP Mean = 3.99		Data Integration Mean = 4.04	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
1 = Very unsatisfied	7	9.6	6	8.3	2	2.7	2	2.7
2 = Moderately unsatisfied	12	16.4	10	13.9	6	8.1	4	5.5
3 = Neutral	17	23.3	17	23.6	12	16.2	12	16.4
4 = Moderately satisfied	21	28.8	21	29.2	25	33.8	27	37.0
5 = Very satisfied	16	21.9	18	25.0	29	39.2	27	37.0

Finally, students were asked whether they understood the concepts of user resistance to change [of new software] and the extent of software customization that may have to be completed on an ERP package. Table 4 shows the results. Fifty-three percent of students believed using the package helped them understand user resistance versus 21% that did not. Likewise, 72% grasped the concept of software customization versus 12% that did not.

<b>Table 4</b>				
	Resistance to Change Mean = 3.63		Software customization Mean = 3.86	
	Frequency	Percent	Frequency	Percent
1 = Very unsatisfied	5	6.9	3	4.1
2 = Moderately unsatisfied	10	13.9	6	8.1
3 = Neutral	17	23.6	12	16.2
4 = Moderately satisfied	17	23.6	30	40.5
5 = Very satisfied	21	29.2	23	31.1


**10. Conclusion**

This paper describes the efforts of faculty from two universities in choosing an ERP system (Oracle), their experiences in implementing the system, teaching with the system, and obtaining feedback from students. Overall, the initiatives have been difficult and wrought with problems, although both sets of faculty will continue to integrate Oracle into their classes, hopefully learning from prior mistakes to better position the package within their respective pedagogies.

Many challenges lie ahead for any university considering adopting an ERP. The authors’ goal is to begin to develop a knowledge base that will assist other faculty in this endeavor. Another goal is to work with the Oracle alliance to facilitate a more structured plan for higher education roll out of the product. Discussions have already begun with OAI on how to best address the problems encountered by The University of Akron and Bryant College.

Although much time was spent implementing Oracle and developing teaching materials, it appears that students perceive it as value added. Although survey results suggest that students found Oracle E-Business Suite (at least the areas they interacted with) complex and difficult to learn, overall they thought that hands on experience with Oracle helped them to grasp important concepts in IS theory. The authors contend that this knowledge is critical to manage in this global and technology-intensive economy. One student stated: “Our company is just now forming a project team to begin looking at upgrading our computer systems. KPMG has been hired to spearhead the effort. The direction we are heading in is ERP. My understanding now of the theory of ERP, the risks, implementation issues, etc. is going to be vital to my roll in the effort.”

**11. Suggestions for Future Research**

The data on student feedback of ERP was a first attempt to determine if integrating ERP into business curricula increased student knowledge of core concepts in ERP theory. The data also measured student satisfaction regarding a particular package, the results of which cannot be generalized to all ERP packages. Future research could measure these dimensions (key concepts and satisfaction) on a longitudinal basis (e.g., beginning of the semester and end of semester) to determine levels of increase. Future research could also look into the curriculum-based features of various ERP packages. A comparative analysis of competing ERP products (e.g., SAP, PeopleSoft, J. D. Edwards) on student feedback would be helpful in assessing the strengths and weaknesses of each product. Such an analysis would help evolve standards for best practices from a curricula standpoint and also provide a framework for product-based integration into accounting and other business-related programs. 



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