Utilizing AOU'VLE with other Computerized Systems

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Abstract

We present in this paper our experience of utilizing the virtual learning environment system with other computerized systems. Arab Open University is one of the first organizations that adopt an e-learning methodology in the Arabic region. We present Moodle as a virtual learning environment (VLM) used at AOU. The integration process of VLE with other online systems such as student information system (SIS) and human resource system (HRS) is discussed. In addition to that we describe the in-house development and enhancement generated to the VLE to cope with AOU regulations and rules. The quality assurance strategy of AOU is clarified.

Keywords: e-learning, open learning, LMS, SIS.

1. INTRODUCTION

The growth of Internet-based technology have brought new opportunities and methodologies in many fields including education and teaching represent in e-learning, online learning, distance learning, and open learning. These approaches are typically use in place of traditional methods and mean that students deliver their knowledge though the web rather than face-to-face tutoring.

Researchers and practitioners were divided into two camps when the concept of distance learning was proposed. Some believed that online and distance learning will reduce the quality of education based on the absence of face-to-face relationships between students and their tutors, and between the student themselves [1]; [2]; [6]. Others supported using Internet-based education, and proved the effectiveness of it by applying both methods in parallel on some courses and comparing student's results, which were nearly equivalent [19]; [5].

In the same respect, many studies address the challenges of distance learning to be accepted in the education community [3]. Johnson et al. [4] claim that "the primary among these challenges is how to meet the expectations and needs of both instructor and the student and how to design online courses so they provide a satisfying and effective learning environment". Owston [7] agrees that "the key to promoting improved learning with the web appears to lie in how effectively the medium is exploited in the teaching and learning situation".

E-learning is a new trend of education system, where students deliver their materials through the web. E-learning is the "use of internet technology for the creation, management, making available, security, selection and use of educational content to store information about those who learn and to monitor those who learn, and to make communication and cooperation possible." [8].

Kevin kruse [17] addressed the benefits of e-learning for both parties: organization and learners. Advantages of organizers are reducing the cost in terms of money and time. The money cost is reduced

by saving the instructor salaries, and meeting room rentals. The reduction of time spent away from the job by employees may be most positive shot. Learning time reduced as well, the retention is increased, and the contents are delivered consistently. On another hand, learners are able to find the materials online regardless of the time and the place; it reduces the stress for slow or quick learners and increases users' satisfaction; increases learners' confidence; and more encourages students' participations.

In this paper the e-learning platform of the AOU is described in section 2. The integration process between virtual learning environment and other computerized system is presented in section 3. Section 4 discussed the requirements and the strategies of quality assurance unit at AOU. Finally, section 5 concludes this paper.

2. The e-learning platform of the AOU

Arab Open University was established in 2002 in the Arabic region, and adopted the open learning approach. An open learning system is defined as "a program offering access to individuals without the traditional constraints related to location, timetabling, entry qualifications."[12].

The aim of AOU is to attract large number of students who can not attend traditional universities because of work, age, financial reasons and other circumstances. The "open" terminology in this context means the freedom from many restrictions or constraints imposed by regular higher education institutions which include the time, space and content delivery methods.

Freed et al. [9] claimed that the "interaction between instructors and students and students to students remained as the biggest barrier to the success of educational media". The amount of interaction plays a great role in course effectiveness [10]. For this purpose and to reduce the gap between distance learning and regular learning, the AOU requires student to attend weekly tutorials. Some may argue that it is not open in this sense; however the amount of attendance is relatively low in comparison with regular institutions. For example, 3 hours modules which require 48 hours attendance in regular universities, is reduced to 12 hours attendance in the AOU.

In order to give a better service to students and tutor, to facilitate accessing the required material from anywhere, and to facilitate the communication between them, an e-learning plat form is needed. A learning platform “is software or a combination of software that sits on or is accessible from a network, which supports teaching and learning for practitioners and learners.”[18]. A learning platform is considered as a common interface to store and access the prepared materials; to build and deliver learning activities such quizzes and home-works; support distance learning and provide a set of communication possibilities such as timetables, videos, etc.

AOU has partnerships with the United Kingdom Open University (UKOU) and according to that at the beginning the AOU used the FirstClass system as a computer mediated communication (CMC) tool to achieve a good quality of interaction. The FirstClass tool provides emails, chat, newsgroups and conferences as possible mediums of communication between tutors, tutors and their students, and finally between students themselves. The most important reason behind using FirstClass was the tutor marked assignment (TMA) handling services it provided. However, the main servers are located in the UKOU which influences the control process, causes delays, and totally depends on the support in UKOU for batch feeds to the FirstClass system [11].

To overcome these problems, AOU use Moodle nowadays as an electronic platform. Moodle is an open-source course management system (CMS) used by educational institutes, business, and even individual instructors to add web technology to their courses. A course management system is "often internet-based, software allowing instructors to manage materials distribution, assignments, communications and other aspects of instructions for their courses." [13] CMS's, which are also known as virtual learning environments (VLE) or virtual learning environments (VLE), are web applications, meaning they run on a server and are accessed by using a web browser. Both students and tutors can access the system from

anywhere with an Internet connection. The Moodle community has been critical in the success of the system. With so many global users, there is always someone who can answer a question or give advice. At the same time, the Moodle developers and users work together to ensure quality, add new ,modules and features, and suggest new ideas for development [14, 15]. Moodle also stacks up well against the feature sets of the major commercial systems, e.g., Blackboard and WebCT [16]. Moodle provides many learning tools and activities such as forums, chats, quizzes, surveys, gather and review assignments, and recording grades.

Moodle has been used in AOU mainly to design a well formed virtual learning environment which facilitates the interaction among all parties in the teaching process, students and tutors, and more over to integrate the VLE with the student information system (SIS) and the human resource system (HRS).

FIGURE 1: The unified image of the AOU e-learning systems

In addition that Moodle is easy to learn and use, and that it is popular with large user community and development bodies. Moodle is flexible in terms of:

- Multi-language interface,
- Customization (site, profiles),
- Separate group features, and pedagogy.

The unified image of the e-learning platform of the AOU from the starting web page shown in figure1, the users will be able to:

- Connect to the SIS, where they could do online registration, seeing their grades and averages as presented in figure2.
- Perform learning activities through the VLE, such as submitting assignments, do online quizzes, etc.
- Retrieve resources through AOU digital library subscriptions.

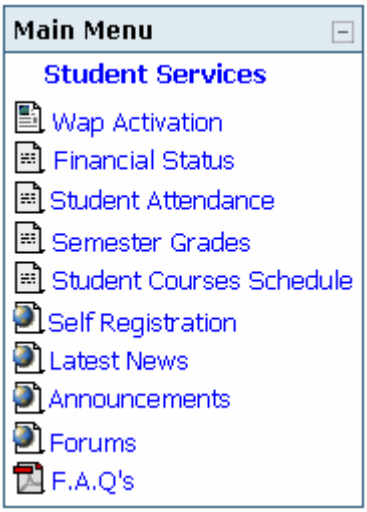

FIGURE 2: The SIS of the AOU

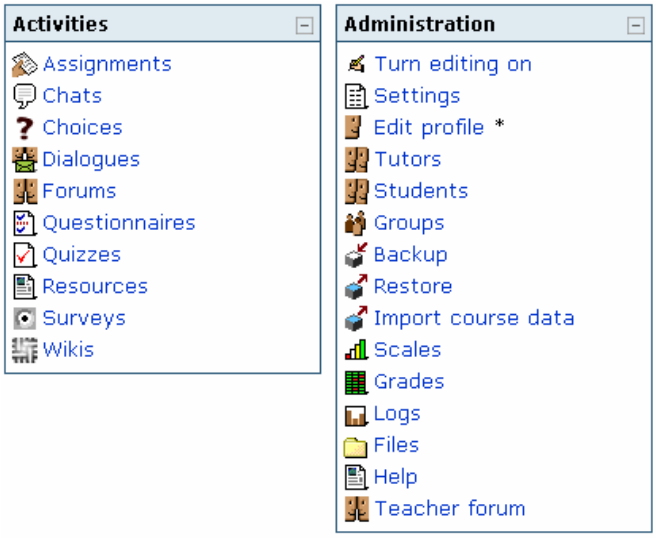

FIGURE 3: VLE course activities and administration

3. Integrating VLE with other computerized systems at AOU

The virtual learning environment (VLE) is software that automates the administration of training events. The term VLE is now used to describe a wide range of applications that track student training and may include functions to:

- Manage users logs, course catalogs, and activity reports
- Provide basic communication tools (email, chat, whiteboard, video conferencing)
- Manage competency (e-Tests, e-Assignments)
- Allow personalization (user profiles, custom news, recent activity, RSS)
- Enable monitoring activities (QA, accreditation, external assessment).

The usefulness of the VLE could be summarized as follows:

- Simplicity, easy creation and maintenance of courses.
- Reuse, support of existing content reuse.
- CMC, TMA, Tests, Progress, learner involvement.
- Security, secure authentication/authorization
- Administration, intuitive management features
- Technical support, active support groups
- Language, true multi-lingual
- Affordability, maintenance and annual charges.

AOU has many computerized systems that facilitate services to students and staff. In the following subsections we will discuss the integration process done on Virtual learning environment (VLE) with Student Information system (SIS), Human Resource System (HRS), and the enhancement needed to integrate such systems together.

3.1 Integrating VLE with SIS

The student information system (SIS) is an Oracle based program which provides the necessary information such as students' information, courses registered, faculties, grades, etc. VLE integration with SIS (or VLE-SIS) is a system used inside the university to reducing accessing time, automatically generating accounts, minimizing faults, mistakes and errors to null, obtaining availability of requirements and simplifying registering, entering and filling process as shown in figure 4.

Arab Open University contains multiple systems that were never designed to work together. The business units that fund these information systems are primarily concerned with functional requirements rather than technical architectures because information systems vary greatly in terms of technical architecture. Enterprises often have a mix of systems and these systems tend to have incompatible architectures. The SIS of AOU is organized into three logical layers: presentation, business logic, and data. When we integrate multiple systems, we usually want to be as non-invasive as possible. Any change to an existing production system is a risk, so it is wise to try to fulfill the needs of other systems and users while minimizing disturbance to the existing systems. The idea is to isolate internal structure of the SIS. Isolation means that changes to one of SIS's internal structures or business logic do not effect other applications like VLE. Without isolated data structures, a small change inside an application could cause a ripple effect and require changes in many dependent applications. Reading data from a system usually requires little or no business logic or validation. In these cases, it can be more efficient to access raw data that a business layer has not modified.

Many preexisting applications couple business and presentation logic so that the business logic is not accessible externally. In other cases, the business logic may be implemented in a specific programming language without support for remote access. Both scenarios limit the potential to connect to an application's business logic layer.

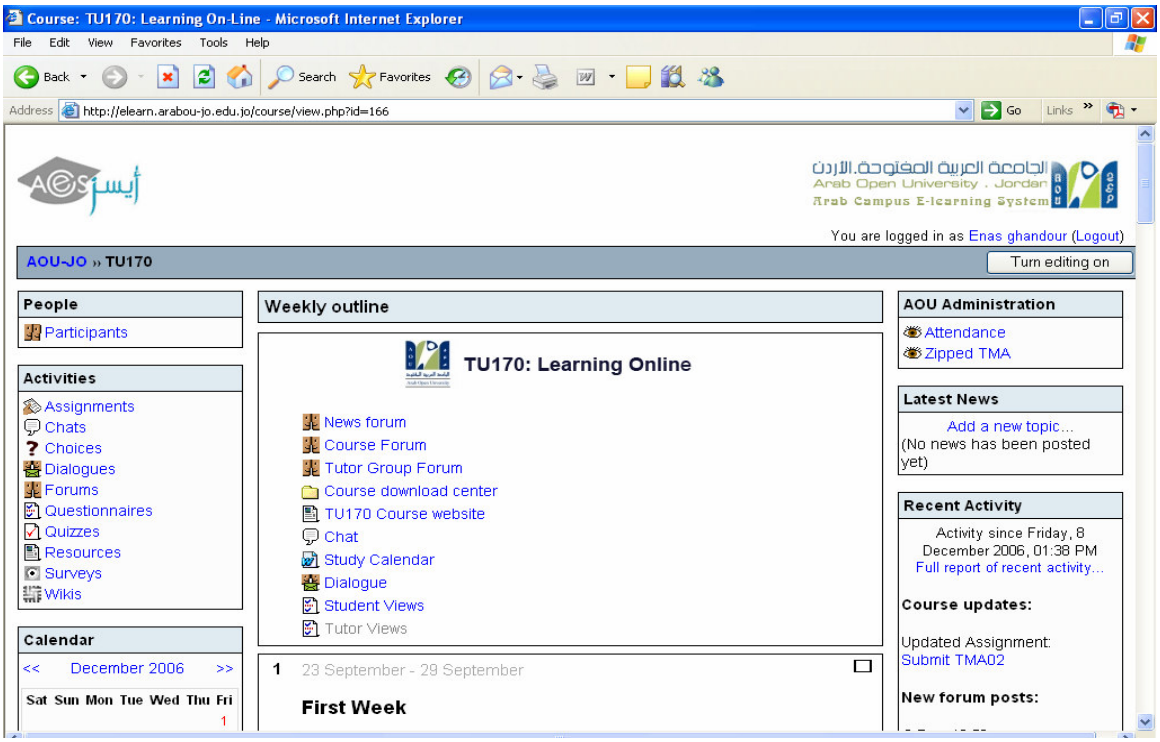

FIGURE 4: The VLE of AOU

When making updates to SIS's data, the advantages of its business logic is that it performs validation and data integrity checks, and this should be considered. The integration between SIS and VLE at the logical data layer is achieved by allowing the data in SIS to be accessed by VLE as shown in Figure 5.

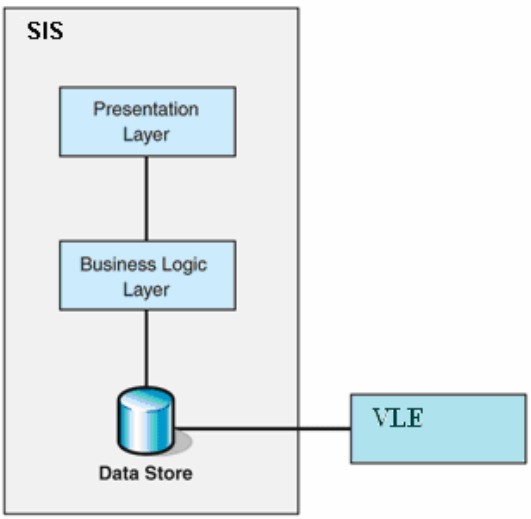

FIGURE 5: SIS-VLE integration

To connect SIS and VLE at the logical data layer, multiple copies of the database are generated instead of sharing a single instance of database between applications, so that each application has its own dedicated store. To keep these copies synchronized, data is copied from one data store to another. This

approach is common with packaged applications because it is not intrusive. However, it implies that at any time, the different data stores are slightly out of synchronization due to the latency that is inherent in propagating the changes from one data store to the next. The integration process added a lot of facilities which reduces time and cost in the following ways:

- Automatic structure enrollment: each student is provided with a username and password which enable students to register automatically.
- Automatic course enrollment: students are automatically enrolled into VLE courses they have been registered.
- Automatic group enrollment: students are automatically enrolled into VLE courses group, as they registered this group in the university.
- Automatically withdraw students from courses where students want to drop or have some financial problems.
- Student semester grades: students are enabled to see their grades through the VLE rather than bringing it from registrar.
- Students registered courses: where students could see the registered courses information such as their groups, time, course names and short names.
- Student's financial issues: where students could see their financial status and payment schedule.

The process is applied by establishing a secure connection to SIS with the minimum privileges, then acquiring data from SIS, after that manipulating it into the VLE as follows:

- Checking if a student exists, if not, register him/her and create a username and password.
- Enrolling students into their courses, and then enroll them into their groups.
- Checking if there is any change in courses or groups and setting data as it appears in SIS.
- Acquiring grades and schedule for students from SIS.
- Checking students with financial problems, and withdraw them from VLE.
- Enrolling new students into placement test, and update their results into SIS.

In addition to the previous automatic operations, other benefits were gained due to the integration process, which are:

- Non-intrusive. Most databases support transactional multi-user access, ensuring that one user's transaction does not affect another user's transaction. This is accomplished by using the Isolation property of the Atomicity, Consistency, Isolation, and Durability (ACID) properties set. In addition, many applications permit you to produce and consume files for the purpose of data exchange. This makes data integration a natural choice for packaged applications that are difficult to modify.

- High bandwidth. Direct database connections are designed to handle large volumes of data. Likewise, reading files is a very efficient operation. High bandwidth can be very useful if the integration needs to access multiple entities at the same time. For example, high bandwidth is useful when you want to create summary reports or to replicate information to a data warehouse.

- Access to raw data. In most cases, data that is presented to an end user is transformed for the specific purpose of user display. For example, code values may be translated into display names for ease of use. In many integration scenarios, access to the internal code values is more useful because the codes tend to more stable than the display values, especially in situations where the software is localized. Also, the data store usually contains internal keys that uniquely identify entities. These keys are critical for robust integration, but they often are not accessible from the business or user interface layers of an application.

- Metadata. Metadata is data that describes data. If the solution that you use for data integration connects to a commercial database, metadata is usually available through the same access mechanisms that are used to access application data. The metadata describes the names of data

elements, their type, and the relationships between entities. Access to this information can greatly simplify the transformation from one application's data format to another.

The system is intended to satisfy the special needs and methodology adopted at the AOU. The SIS is flexible enough to adapt to the specific needs of branches while maintaining a unified standard that facilitates the interoperability of the system amongst branches and the headquarters. The SIS performs all aspects of students' information functions from filing an application to admission up to graduation, within the AOU methods. The SIS deals with all the entities involved and facilitate an easy and reliable way of the entities to perform their functions.

3.2 In-house development and enhancements

To fit the AOU requirements and specification, a number of modifications and customizations were made including:

- Log records: Logs are replicated into other isolated tables, to increase performance, and to keep track records for long period, while removing these log records from original tables timely. It is important to monitor the activities of students as well as tutors over the VLE to assure full participation from all members of the learning process.
- Students' attendance and absences: The system is now capable of monitoring and recording the attendance online during face-to-face tutoring.
- Capturing random samples for the required course activities such as TMAs, online quizzes, and online finals. This automatic process creates a folder for each course and inside each folder there are subfolders according to the sections of the course. In each section folder, the system stores three random samples of the required documents according to the diagram in Fig. 6.
- Grade reports: One of the main development features of integrating VLE and SIS is to migrate grades from VLE to SIS at the end of the course where the grades are recorded for administration purposes and all statistical and grade distribution reports are generated. These reports are migrated back to VLE to be stored in the appropriate subfolders for each course sections (see Fig. 6).
- Questionnaires: Instead of performing student questionnaires manually and then entering data for analytical purposes, we have developed an online questionnaire feature to VLE where each student in each course fills this form online to evaluate the course, the tutor, and tutoring environment. This development saves a lot of efforts and the resulted statistics are becoming more accurate. Same development is applied for tutor review questioner.

3.3 Integrating VLE with HRS

AOU uses a computerized system called human resource system to serve the employees and to keep all employee's records and transactions including:

- Basic information and details related to the employee and the changes that take place.
- Personnel information related to the employee.
- Academic qualifications of employees.
- Practical experience of employees.
- Personnel documents and attended workshops.
- Allowing all employees to take leave or vacations and following up on the rejection or acceptance of these online.
- Do all financial tasks and issuing salary slips for employees and emailing them to the private account of employees.
- General different types of required reports

By connecting VLE with HRS, all the required information regarding tutors and other academic teaching personnel information will be automatically migrated from HRS to the VLE. This process saves a lot of efforts and reduces time and redundancy of storing information, in addition to the increase of efficiency and accuracy. The process starts at the beginning of each semester by creating the groups for ever

offered course over the VLE platform. All required information for creating groups and assigning tutors are migrated from the semester timetable in the SIS system. The time table contains group details in addition to tutor identification number. The rest of required tutor information such as email, department, major, title, etc are collected from the migration with the HRS. Many further studies regarding the integration of SIS with all computerized systems still in progress to obtain more efficient procedures within AOU daily functions.

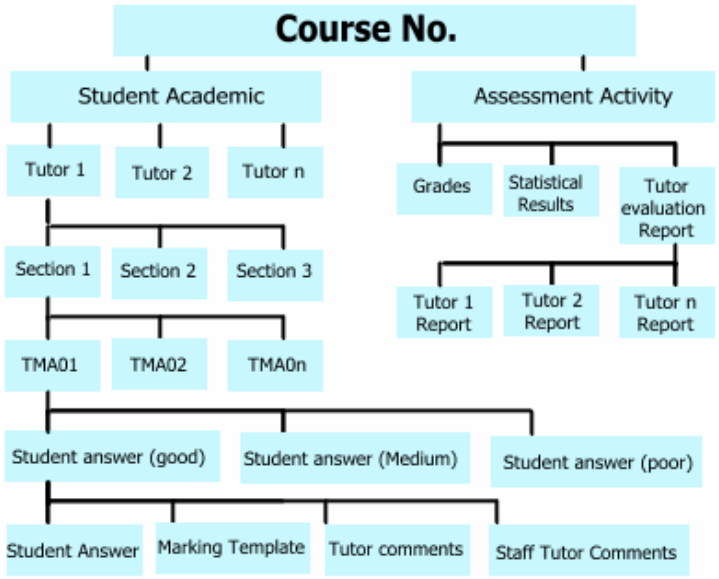

FIGURE 6: Filing structure of courses samples.

4. Quality assurance strategy at AOU

AOU partnership with UKOU requires a set of conditions that has to be fulfilled from AOU side, one of these conditions is to be subject to the review of OUVS, Open University Validation Services, which is the quality assurance accreditation unit of UKOU. OUVS follows the quality assurance standards of QAA agency. Arab Open University with the collaboration with UKOU performs a number of procedures to guarantee the quality of learning process. The descriptions of these procedures are summarized in the following points:

- TMA marking template: Tutor marked assignment template is a form filled by the tutor of a course for each submitted TMA by students. It contains the deserved grade for every part of the TMA along with the feedback comments to the students.
- TMA monitoring: A form filled by the course coordinator and the program coordinator designed for monitoring tutors marking and filling the TMA templates.
- TMA samples: Three TMA samples should be collected for each section. One with a good grade, one is average, and one with a low grade.
- Quiz samples: Three samples should be collected for each quiz.
- Final exam samples: Three samples should be collected for each section of every course.
- Student questionnaire: A questionnaire filled by the students of every section to monitor the tutor, the course, and the tutoring environment.
- Tutor view questionnaire: A questionnaire filled by tutors to monitor the course content and the tutoring environment.
- Face-to-face preview: A form filled by the program coordinator to monitor tutor performance after attending a tutoring session of a specific tutor.

- Final grade statistics and distributions: grades reports and distributing of grades generated by SIS system after submitting student final grades.

At the end of each semester, each course coordinator has to prepare a complete folder that contains the following documents:

- Three samples of a marked TMA for each tutor in the course, each sample should be associated with its marking template and its monitoring form approved by the program coordinator. Notice that the three samples should be selected randomly; one is good, one is average and one is weak, and this is done automatically nowadays.
- Three samples from each quiz during running the course. One sample from each of the good, average and weak categories.
- Three samples from the marked final exam of the course. One sample from each of the good, average and weak categories.
- 4-The face-to-face monitoring form for each tutor.
- The tutor monitoring forms
- Results of student questioners on the course level and for each tutor.
- Students' grades
- Grade distributions and statistics.

One of the duties of the program coordinator is to supervise the preparation of the above documents for all courses in the program and send them to the headquarter of the university to be reviewed from the external examiners whom usually come from UKOU.

Notice that preparing and performing such documents consume the time and efforts of many administrational and educational members of the university including tutors, course coordinators, program coordinators, and secretaries.

5. CONSLUSION & FUTURE WORK

Arab Open University is an educational institute that depends on the strategy of open learning and distance learning to deliver its educational mission. The backbone of the learning process is using e-learning technology. The need for virtual learning environments to deliver the courses online becomes a significant issue. We discussed the efficient features of Moodle as a virtual learning environment used in the Arab Open University. In this paper, a complete description of the improvements that have been conducted over the virtual learning environment at AOU is introduced. The integration process between VLE and student information system (SIS), VLE and human resource system (HRS) with clarifying the advantages of such integration is discussed. The university strict regulations on the learning process to assure the quality of delivering all learning activities in an optimal way. Accordingly, there is a need to improve the existing virtual learning environment to guarantee the implementation of such quality assurance regulations electronically to save effort and to perform all required procedures.

Our new trend at AOU is to integrate VLE system with mobile technology, where students could receive the important notifications and messages through their mobile devices. We are investigating the needs and requirements to manage to do that.

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