

# A Cloud Qur'an Application Using Drupal Technology

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**ABSTRACT:** *The paper aims to develop and design a cloud-based Quran portal using Drupal technology and make it available in multiple services. The portal can be hosted on cloud and users around the world can access it using any Internet enabled device. The proposed portal includes different features to become a center of learning resources for various users. The portal is further designed to promote research and development of new tools and applications includes Application Programming Interface (API) and Search API, which exposes the search to public, and make the searching Quran efficient and easy. The cloud application can request various surah or ayah using the API and by passing filter.*

**Keywords:** Cloud Qur'an Application, Drupal, API

**Received:** 12 November 2013, Revised 20 December 2013, Accepted 24 December 2013

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## 1. Introduction

A variety of Quran related applications and software have been developed for the needs of online and offline users. These tools have been designed with various contents and technology. Increase in use of Internet, users is now able to browse a great number of websites and learn about Qur'an, Hadith and other Islamic literature. In this work, we present a research design and implementation of application using Drupal and can be hosted so various uses can benefit with these applications and tools. The design and implementation of API promotes the creation of new tools by users. In addition, the users of the proposed API can rest assured about the quality and accuracy of the Quran text retrieved through the interface. This feature is very important, as any application on Quran must ensure the accuracy of the Quran text it displays. Otherwise, the authenticity and validity of such a system will be undermined greatly. The most unique feature of our portal is promotion of creation of new tools by users. The availability of fast internet access, broad band connectivity, and growing number of Internet and mobile users, more and more Quran applications are now available with simple to more advanced features and services. The Available Quran applications in the market currently are based on the following:

- Quran Recitation
- Quran Memorizer
- Quran Translation & Transliteration
- Quran Training Sessions
- Quran Text and Image watermarking

- Quran Authenticity forum etc.

There are lot of Quran websites available; there is no single application that covers all aspects. This research will help create a platform for people to track their faith, deeds and improve them, promote the creation of tools around Quran as the data is centrally hosted and available for developer at minimum cost, and will also promote the research and study of Holy Quran, through usable and easy Holy Quran search tool. The target of this paper is to build a cloud Quran portal that is available in multiple services, such as: create highly usable and easy Quran Tool, and make it accessible from Internet enable devices irrespective of their platform, and development a Quran API then promote creation of tools for Quran, and make searching Quran efficient and easy.

This paper is divided into 5 sections. Section 1 introduces the paper and lays down the foundation of the paper. Section 2 provides a summary of up to date review of the related work in the area of research and development for Quran application, with a concentration on transliteration of languages. Section 3 talks in details about the proposed framework used in this work along with the software methodology, system architecture, technologies stack, design and development methodologies, implementation, and other related technical information. Section 4 presents the results of the developed application. Finally, section 5 concludes the paper with some key achievements, recommendations, and future work plans.

## 2. Related Work

### 2.1 Holy Quran – KSU Electronic Moshaf Portal Project, '<http://quran.ksu.edu.sa/>'

It is one of the best comprehensive online portal sites on Holy Quran. Users can view scanned (soft) copy of real printed Mosshaf. It also provides online recitations by many famous reciters. Users can repeat each Aya as many times as desired. Search feature is also available, which includes, direct browsing the Mosshaf by chapter/verse, part or page number, six Arabic commentaries. Other features include, one English commentary, Grammar, text translation of the Holy Quran meanings for more than 20 languages, voice translation of the Holy Quran, meanings for two languages (English and Urdu), sync between recitation and Ayah position in the Page (highlighting Ayah while recited), sync between recitation and voice translation [1]. Figure 1 shows screenshot of 'Holy Quran – KSU Electronic Moshaf Portal Project.

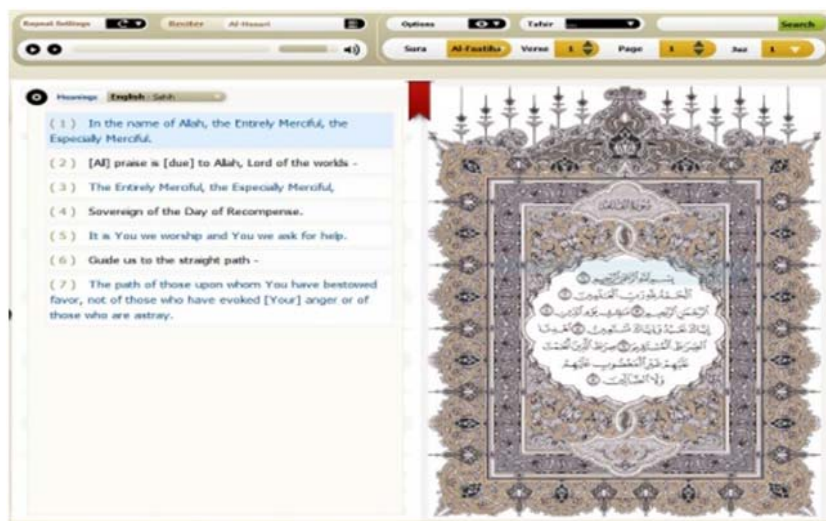


Figure 1. Screenshot of 'Holy Quran – KSU Electronic Moshaf Portal Project

### 2.2 Holy Quran Android, '<http://www.holyquranandroid.com/>'

This is another very useful Quran portal application, which provides users with many facilities. It uses rich featured Holy Quran application to read or memorize Al-Quran. Users can easily download and listen to Quran recitation in the voices of many reciters, while each verse is highlighted as it has been read. Users can choose the script (With Tashkeel or Without Tashkeel). It has a powerful search capability to search in the translation of whole Quran Al-Kareem or a selected surah. Users can jump to any verse of any surah, bookmark any verse or add custom notes with each verse. Translations in different languages are also available [2].

Designed and developed a system, called ‘*E-Hafiz*’, which is based on an idea that Tajweed rules were used to train learners how to recite Quran. To achieve this the authors have used the Mel-Frequency Cepstral Coefficient (MFCC) technique, in which the features of recorded voices are extracted using MFCC and compared with experts’ voices, stored in the database. If any mismatch on word level was pointed out, then user would be asked to correct it [3].

### 2.3 Quran Memorization program, <http://www.imaanstar.com/>

This software is a new addition to online ‘*Quran Memorization*’ series of software. It is quite simple and yet very effective. Users can create their own profiles for memorization. Using the ‘Drag and Drop’ users can see graphical way to view their memorization progress. Other features include, loop Ayas, loop Surahs, stack mode, single ayah mode, pause mode, surah playback progress, etc. [4]. Figure 2 shows screenshot of software ‘*Quran Memorizer*’ by Immanstar.com.

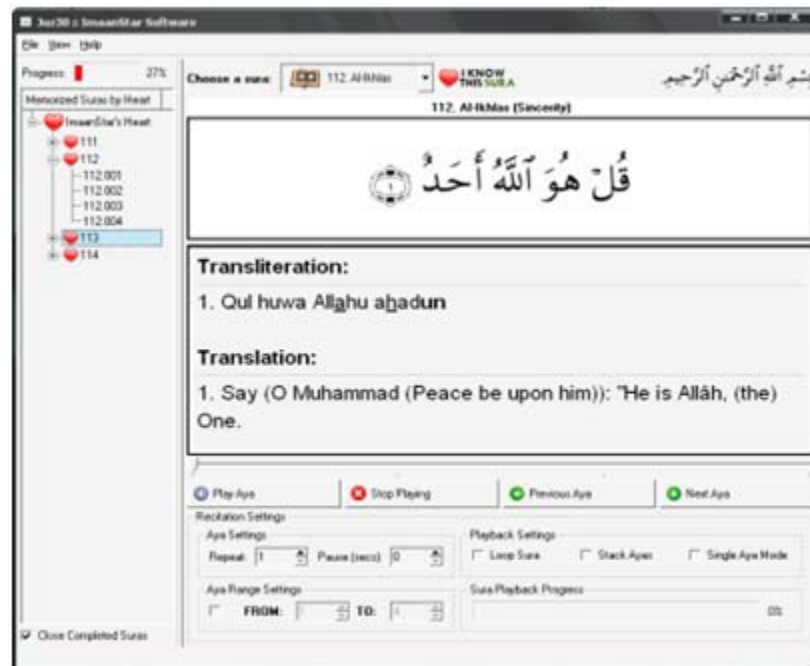


Figure 2. Screenshot of software ‘*Quran Memorizer*’ by Immanstar.com

This research aims to explore the approach to represent and classify the AI-Quran knowledge by using ontology. The ontology model for AI-Quran is developed according to the themes of AI-Quran knowledge as described in Syammil AI-Quran Miracle the Reference. According to author, the ontology approach has shown that the AI-Quran knowledge can be classified and presented to the readers systematically. The study further claimed that the ontology structure that representing the relationships among the theme concepts in AI-Quran was reviewed and validated by the domain experts in AI-Quran [5].

## 3. Proposed framework

In this paper, we provide an account of research work being develop for a cloud-based portal of variety of Quran applications, both for portable and non-portable devices. The main idea of this paper is to provide an account of latest technologies used in design of this portal.

### 3.1 Platform development

In this paper, we have used LAMP platform to develop the Quran portal, search and API features. It is worthwhile to mention that in modern times, this platform is used by important sites, such as, government organizations, banks and multi-national companies, e.g., Google, as this platform provides robustness, and security. Figure 3 shows the system architecture of a typical LAMP portal, used in our project [11].

The technology stack of ours includes PHP, MySQL, Apache, Drupal 7, Gnu/Linux OS, and Twitter Bootstrap. Drupal is a free

and open-source content management framework (CMF) written in PHP and distributed under the GNU General Public License. Many websites use Drupal worldwide ranging from personal blogs to corporate, political, and government sites including whitehouse.gov and data.gov.uk. It is also used for knowledge management and business collaboration. And for building platforms such as ours. The standard release of Drupal, known as Drupal core, contains basic features common to content management systems. Huge platforms that are scalable, flexible and secure can be built on top of this. We have used Drupal to build the platform.

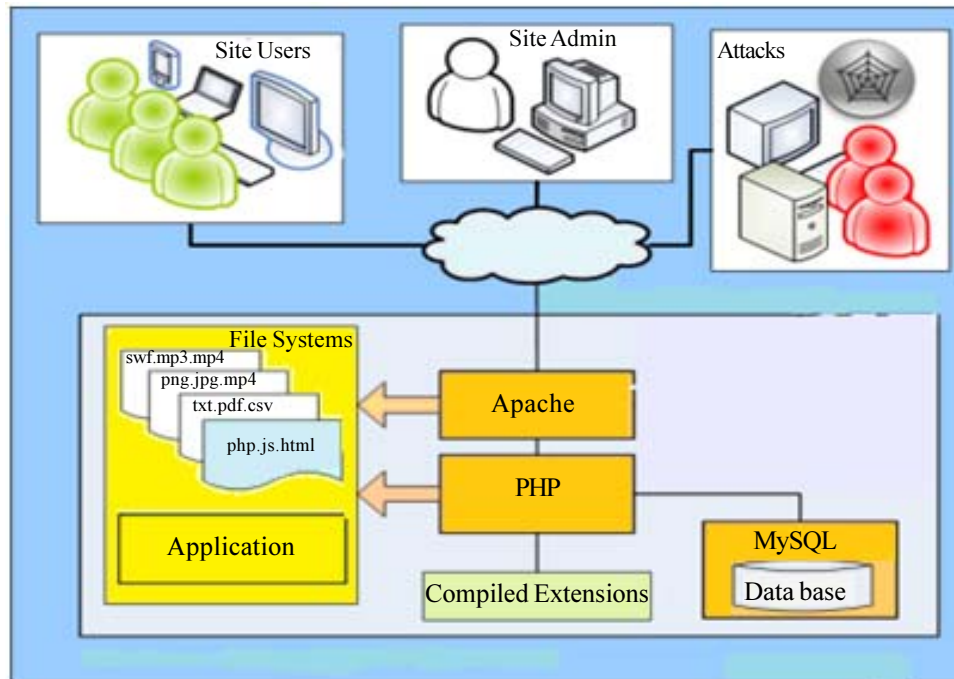


Figure 3. Structure of a typical LAMP Portal (Source: Bodvoc Ltd. 2010) [6]

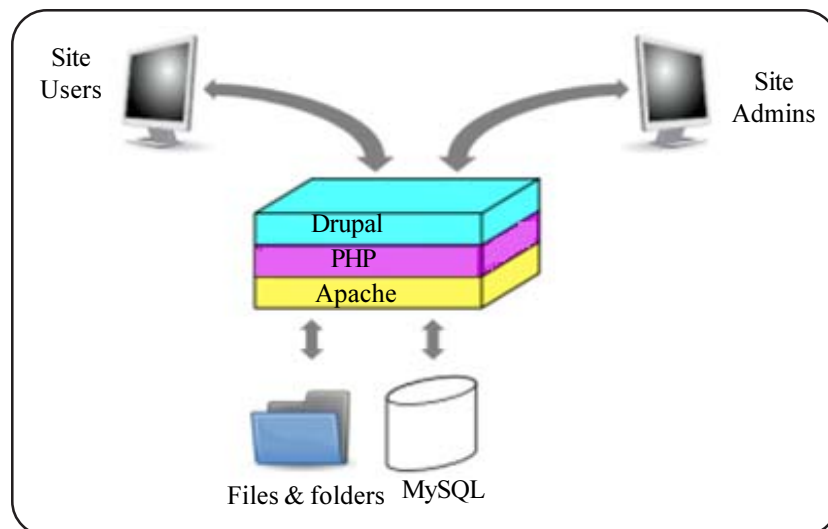


Figure 4. Diagram showing stack of technologies used in our project

### 3.2 Technology stack used in the application

The technology stack of our project includes PHP, MySQL, Apache, Drupal 7, and Twitter Bootstrap. Stack of these technologies can be shown in a top-level structure, as depicted in Figure 4. It shows Drupal, PHP, Apache, and MySQL components of the stack. It also shows how site admins and site users interact with the stack of technologies [7]. This is a rather more simplified

form of the diagram shown in Figure 3.

Many technologies have been used in this project such as PHP, MySQL, Apache, and Drupal which is a free and open-source content management framework (CMF) written in PHP and distributed under the GNU General Public License. Many websites uses Drupal worldwide ranging from personal blogs to corporate, political, and government sites including whitehouse.gov and data.gov.uk. It is also used for knowledge management and business collaboration. In addition, for building platforms such as ours.

The standard release of Drupal, known as Drupal core, contains basic features common to content management systems. Huge platforms that are scalable, flexible and secure can be built on top of this. Figure 5 describes in brief the Drupal environment with its main components, Figure 6 shows a bird's eye view of Drupal architecture.

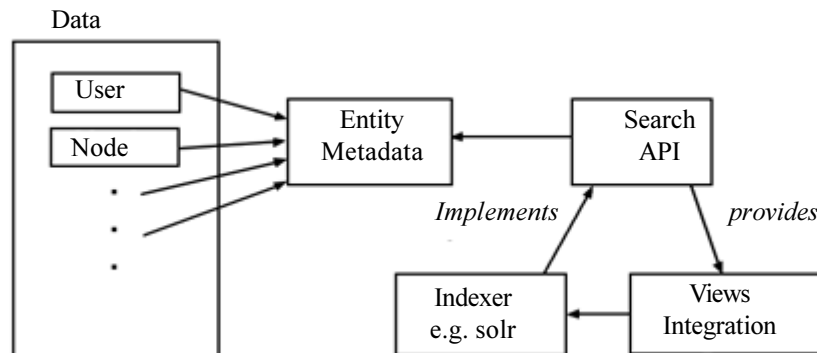


Figure 5. Pictorial view of Drupal environment with its main components

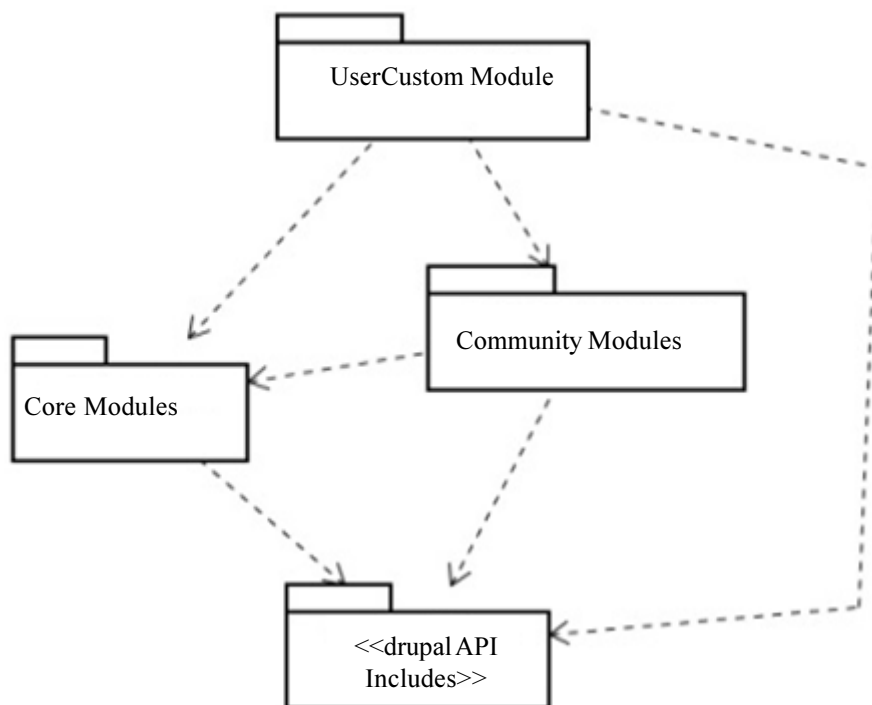


Figure 6. Bird's eye view of Drupal architecture [8]

At the ground level there is Drupal API. It implements the basic functionality of the module system and of the CMS. Physically it is made up by a folder called includes/ which contains a set of PHP files (named with .inc extension). Each of this PHP file implements an API that can be exploited by upper levels modules.





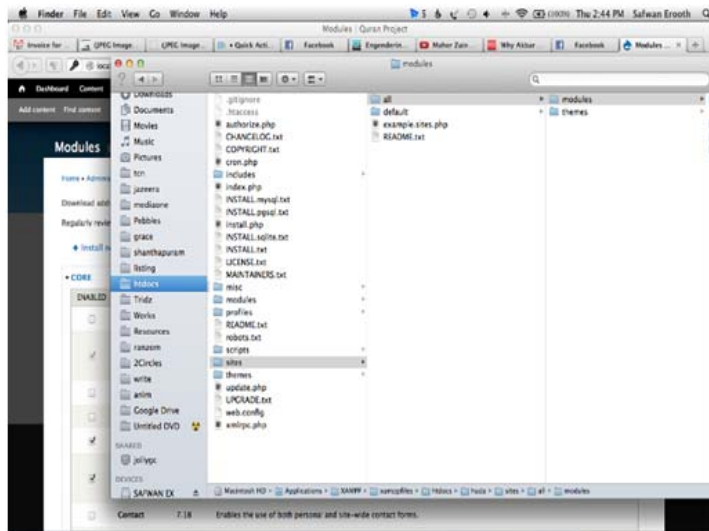


Figure 9. Folder structure of the Drupal installation

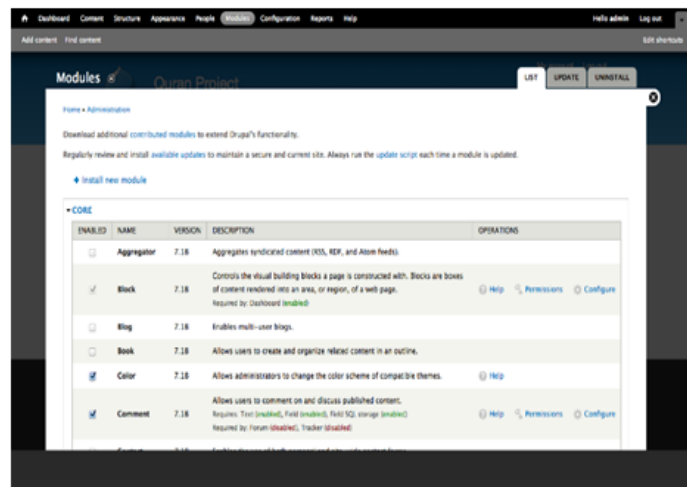


Figure 10. Another screenshot of Folder structure of the Drupal installation

contribute module like views, search API, searchapi\_db, facet API, and search API ranges, etc. The complete Quran data is stored as an entity within Drupal, as shown in Figure 13. The metadata, such as Meccan/Madinan etc., are stored as fields attached to this entity using the core Drupal field API. Using of entity instead of core node saves a lot of unwanted weight in the db. It also allows more flexibility in longer run.

We have used this core entity of Drupal and then extended to create our own bundle for Surah and Ayahs etc. of Qur'an. Then added fields using field API.

Fields can be added to any of the bundles (or entity types) to help organize their data. Say, for example, we created field for Quran like ayah no., surah reference, Meccan/Madinan etc. Without this it would make it more difficult, then, to control how these were displayed, or to make connections between different types of related content. This is where using fields is essential. Figure 14 shows a diagram of Entity Quran.

### 3.5 Design and development of search API

We have made use of the core Drupal search functionalities and then extended it with the following contributed module:

- Search API

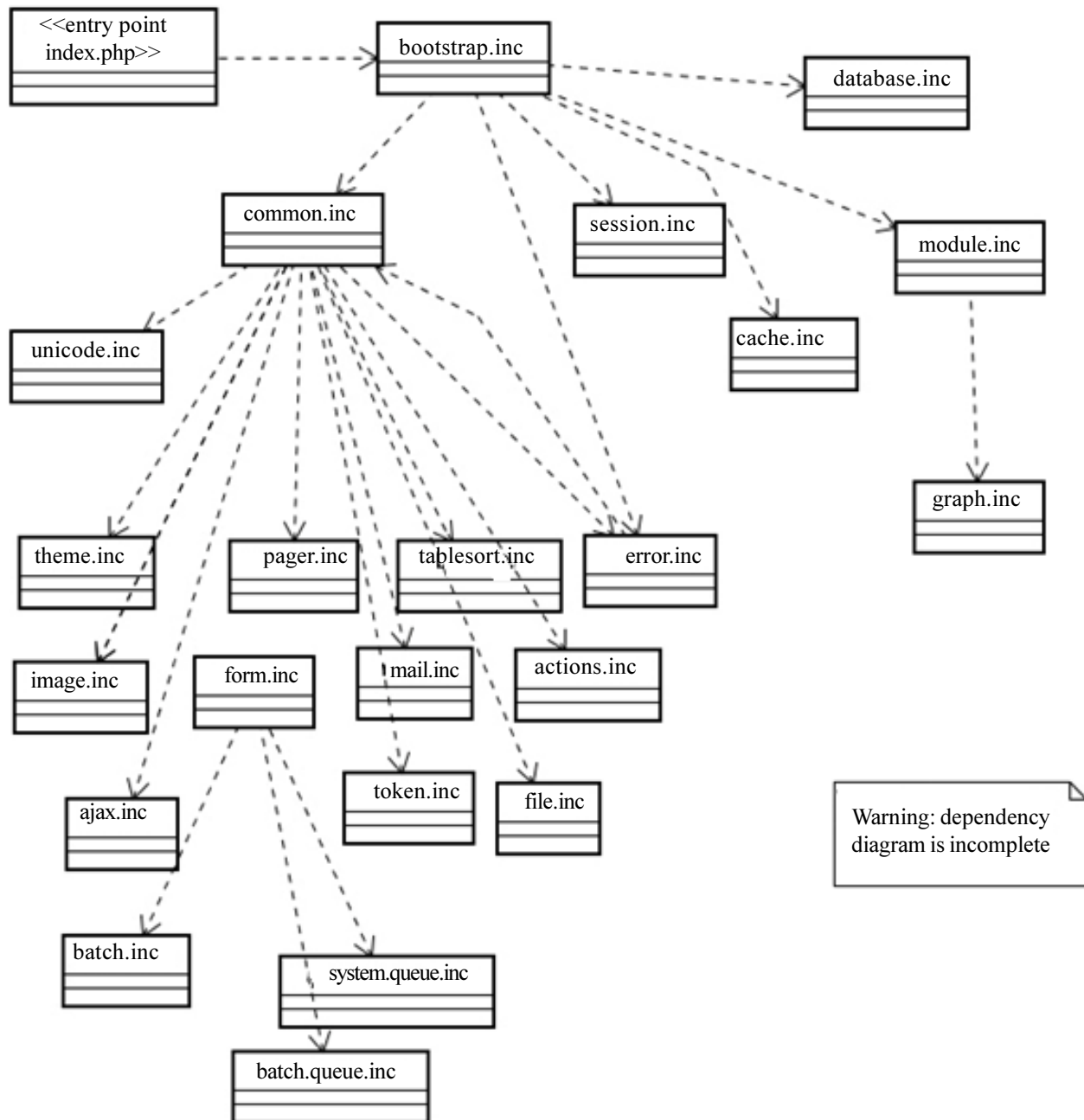


Figure 11. Dependency diagram of Drupal API

- Faceted API
- Search API DB
- Views

Search is done by facet API. Therefore, that multiple filters can be passed and the filters work intelligently. Following two cases has been tried:

**Case 1:** Users can search by first entering some Arabic Text, say “*Bismillah*” and then add a surah filter, like Fatiha and then can set an ayah range. Say from ayah 1-3. Then the search will only search “*Bismillah*” in the Surah “*Fatiha*” and between Ayahs 1-3.

**Case 2:** By default if you have set a surah filter, the Meccan/Madani filter will reflect the change. For example, if you have filtered



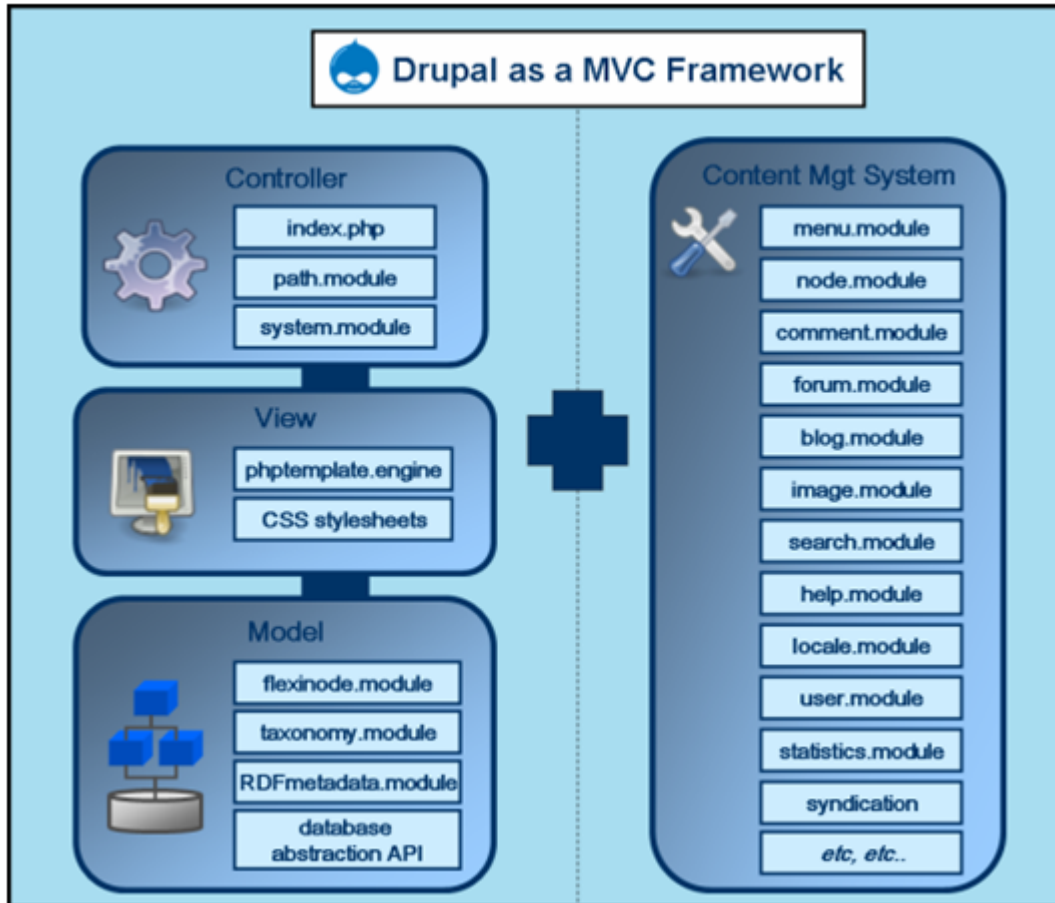


Figure 12. A view of Drupal as a MVC Framework

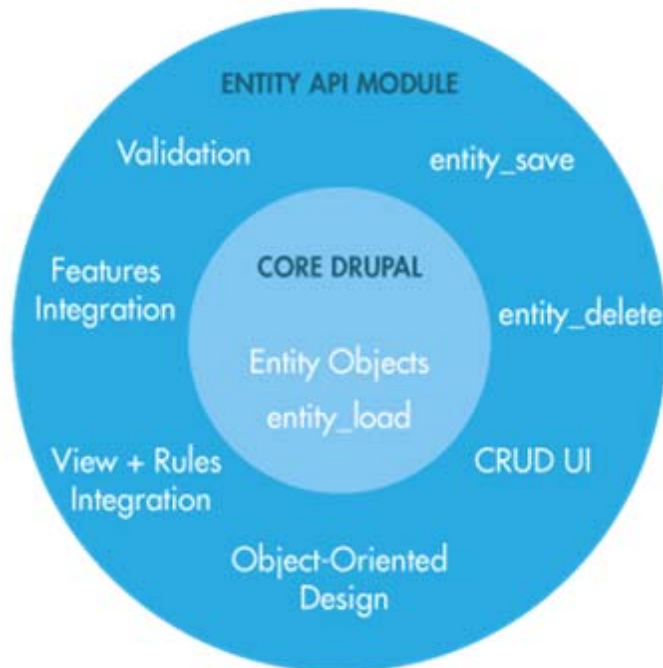


Figure 13. Quran data stored as an entity within Drupal

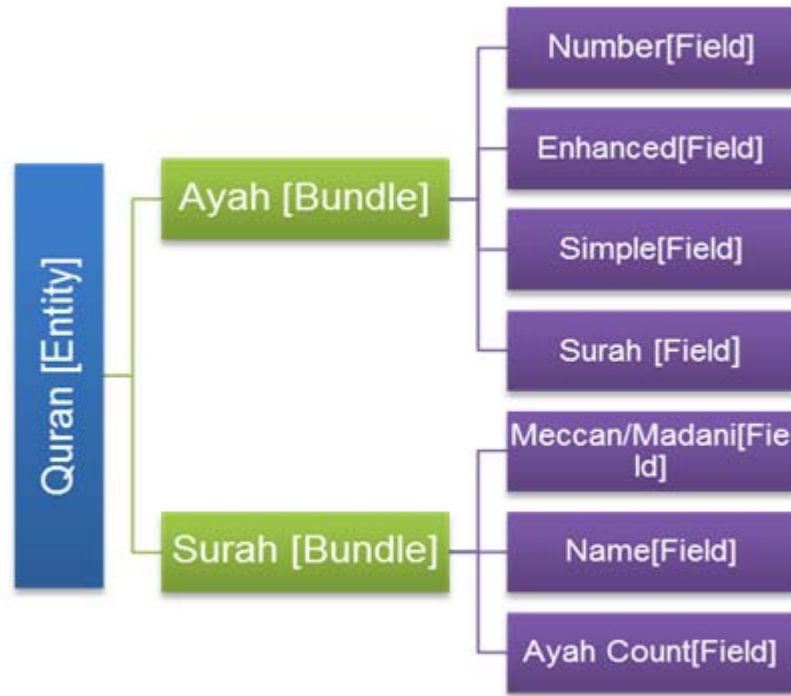


Figure 14. The Diagram of Entity Quran [9]

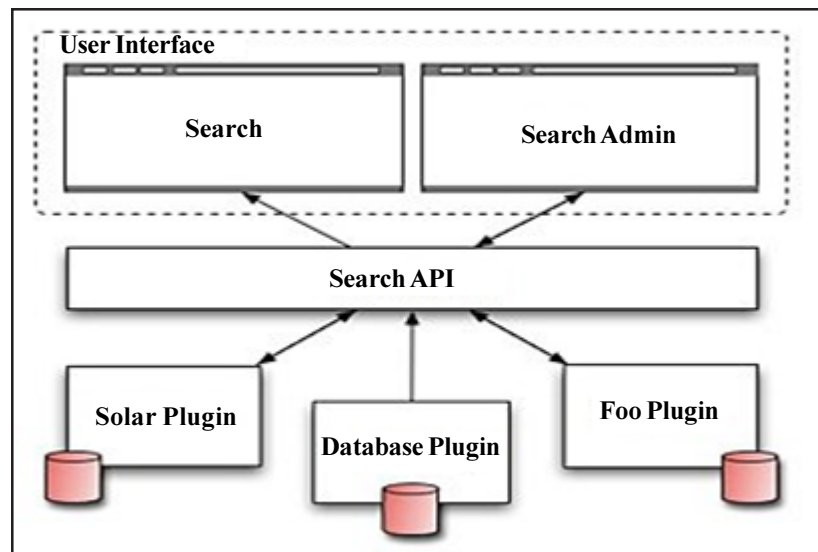


Figure 15. Block diagram of Search API architecture

to search only a Surah revealed in Mecca, then the filter to choose to Meccan/Madani will be blurred until you cancel the Surah filter.

Search API module provides a framework for easily creating searches on any entity known to Drupal in our case the Quran entity. It already incorporates faceting support and the ability to use the Views module for displaying search results, filters, etc. It also gives the flexibility to extend the search later using any technology like Apache Solr etc. A block diagram shown in Figure 15 depicts Search API architecture.

### 3.6 Quran API

The search feature is categorically exposed as API, this is done using the services module. An external app or a website can request the site with certain options and filters Ayahs from the site, which in turn can be used to create various tools of Quran related topics. API Service call-backs may be used with multiple interfaces like REST, XMLRPC, JSON, JSON-RPC, SOAP, AMF, etc. This allows the portal site to provide web services via multiple interfaces while using the same call-back code.

We are using the Drupal Services module to make this possible. Our entity interfaces with the Services API to return appropriate result for the requests. The API is also plugged into Drupal's inbuilt roles and permission system, which gives us fine grain control over what is available and what is not. Only difference of API from search of API form, search is that, this give an interface for external apps/sites to get information out of site. Quran API enables applications to make use of our data. This was implemented with the help of services module. There will be a read only system implemented using Services module in Drupal. Each user will be given authentication to the API request. Figure 16 described the formats that are used.

a. {surah}/detail	b. {surah}/{Ayah}	c. {surah}/range/{N-N}
<ul style="list-style-type: none"> <li>• This would return the meta data of the requested surah.</li> <li>• e.g., 'http://api.quranproject.com/36' would return the metadata of 36th surah.</li> </ul>	<ul style="list-style-type: none"> <li>• The will return the metadata of an Ayah, including all the fields we have in our database.</li> <li>• e.g., 'http://api.quranproject.com/36/1' would return first Ayah from the 36th chapter</li> </ul>	<ul style="list-style-type: none"> <li>• The will return short metadata of an Ayah between a specified range.</li> <li>• e.g., 'http://api.quranproject.com/36/range/1-10' would return Ayahs 1 to 10 from the 36th chapter.</li> </ul>

Figure 16. Format of the authentication to the API request

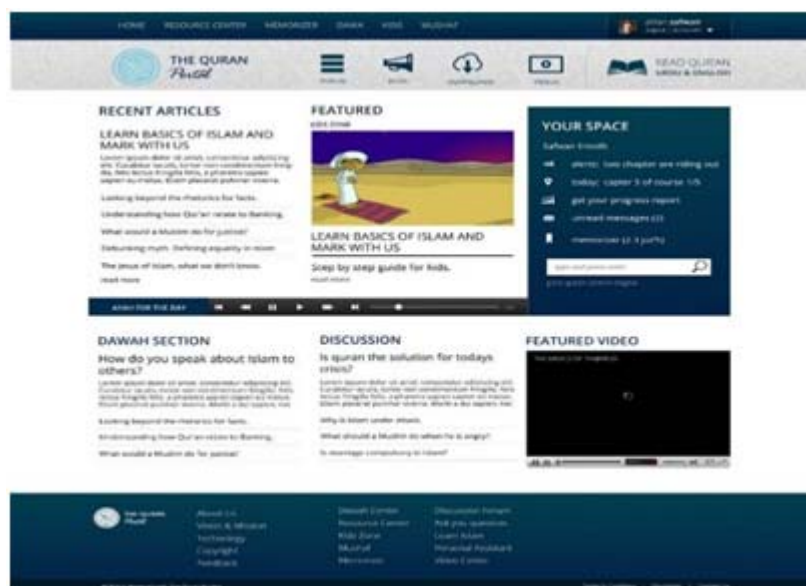


Figure 17. Screenshot of the Homepage screen

Sura

Sura

Sura No. (Example: 2 fro Surah Baqra)

Ayat

Ayat

Limit to specific aya.

Page

0

10 Ayah is loaded at a time. Type no.of pageto offset

Submit

Figure 18. Screenshot of Search API

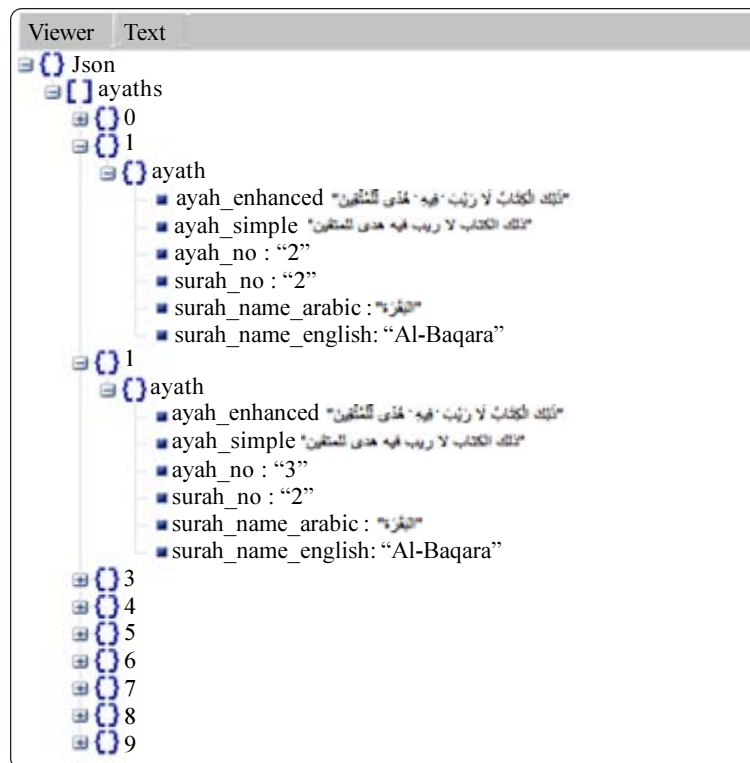


Figure 19. A small of API Search for loading Ayahs from Surah 2

### 3.7 Testing the Search API module

This module provides a framework for easily creating search on any entity known to Drupal software, using any kind of search engine. For site administrators, it is a great alternative to other search solutions, since it already incorporates faceting support and the ability to use the Views module for displaying search results, filters, etc. In addition, with the ‘*Apache Solr*’ integration, a high-performance search engine is available for this module.

## 4. Results

The application contains many sub-systems; these systems were applied through a number of different techniques and methods. Accordingly, this section will review the results that have been implemented.



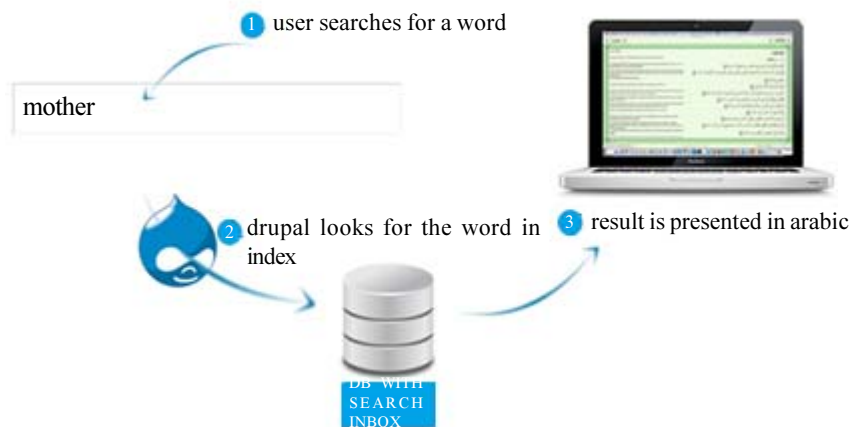


Figure 22. Visual illustration of Holy Quran search process

Below are the interfaces provided by the site over public http request

- [http:// trd.com/ quran\\_portal/ api/](http://trd.com/quran_portal/api/)

to get all the ayaths of a surah, one has to request can pass this request, like

- [http:// trd.com/ quran\\_portal/ api/ 1](http://trd.com/quran_portal/api/1)

to get a specific aya of a surah, one has to request can pass this request, like

- [http:// trd.com/ quran\\_portal/ api/1/1](http://trd.com/quran_portal/api/1/1)

The API would only return 10 results at a time, so in order to get to the next page, one can append a pagination query, like

- [http:// trd.com/ quran\\_portal/ api/ 2/?page=3](http://trd.com/quran_portal/api/2?page=3)

Figure 23. The URL of the API

The home page screen has articles and resources, coming from various sections of the website. It has been embedded with an audio player that plays the Ayah of the day which is changed for every day. On the right side of the home page, there is the user panel called the '*your space*', which lists all the user specific data for logged in user. Whatever the user has read, bookmarked, the reminders and alerts that were popped up, all come up here. It is like the users dashboard. On the top right side of the page, there is information about logged in users, with a picture and a welcome message. Users can also log out from there. Figure 17 shows a screenshot of the site, which displays the main menu, and underneath it shows the main sections of the site. The contents are displayed from the already added articles by category.

There is a screencast available, showing off some of project's features. Figure 18 shows a screenshot of Search API, which will



return a JSON object of the first 10 Ayahs from the surah.

Figure 19 shows a piece of code that aims to send a request for the second surah (that is Al-Baqara); it returned the JSON object, viewed here using JSON viewer tool. Figure 20 shows a screenshot of the normal view of the Search Results [10].

Figure 21 shows a screenshot of the view configuration that handles and delivers the requests.

Quran Search is designed and developed using search API module of Drupal 7 software, which enables us to store the indexing in DB or Apache Solr. The API facilitates the users to search for Ayahs in Arabic using their own language as shown in Figure 22. To the best of our knowledge, such cross-lingual search is the first of its kind for Quranic text. For example, people don't need to know the Arabic word امي (means 'my mother') to search about 'mom' in the Holy Quran text. They could search 'mom' in English or the equivalent word in Urdu or Arabic, or even in Urdu transliteration. They will be instantly presented with the results in Arabic. The same is true vice versa; an Arabic search could bring up English results. The most interesting part of this is that, a new language can be added and all the features work with that language instantly. This feature can also help users to search for Holy Quran audio in their preferred language.

Search API is implemented over Views module. It exposes the search to public. Apps, Websites or any similar systems can request various surah or ayah using the API and by passing filter. The result is exposed in form JSON that is easy for these systems to consume and process. Figure 23 illustrates the URL of the API. [12]

Each returned Ayath object will have the following fields:

- Surah Number
- Surah Name
- Ayath Number
- Ayath Simple Version.
- Ayath Enhanced Version.
- Ayath Enhanced Version

#### 4. Acknowledgment

The authors would like to acknowledge the financial support provided by the IT Research Centre for Holy Quran (NOOR) MADINA Saudi Arabia, under research project reference number, NRC1-1, entitled, 'Developing a Complete Online Quran Portal and Mobile Friendly Qur'an.

#### 5. Conclusion

In this paper, we present the development of an integrated portal for Qur'anic applications. We identify the key design issues for the portal design, keeping in mind the possible uses of such a portal. A key aspect of the proposed portal is its reusability through a set of APIs. These APIs are accessible through the portal when it is deployed in cloud. Third party applications can utilize these 'Qur'anic' APIs to further develop Qur'an related applications, with much less effort on retrieving Qur'anic verses/chapters. In addition, we develop a working model of such a Qur'anic portal using the state of the art Drupal platform. We also identify the key technological issues in such a development task and illustrate the implementation phases.

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