ISSN: 2754-6705

Journal of Mathematical & Computer Applications

SCIENTIFIC Research and Community

Review Article

Open Access

Oracle APEX for Global Audience: Globalization Methods, Insights and Comparison with Google Translate

Ashraf Syed

USA

ABSTRACT

Oracle Application Express (APEX) offers developers a powerful platform for creating applications that meet diverse linguistic requirements. This article serves as a comprehensive guide to developing a multi-language application on the APEX platform catering to a global audience. It discusses methodologies, techniques, and strategies for globalizing the application to support multiple languages in APEX. Furthermore, it emphasizes the advantages of using APEX's built-in features over-relying on a third-party tool, Google Translate.

***Corresponding author**

Ashraf Syed, USA.

Received: January 04, 2024; **Accepted:** January 11, 2024, **Published:** January 18, 2024

Keywords: Oracle APEX, Multilingual Application, Translation, Localization, Document Direction, Xliff, Translation Repository, Google Translate

As the world undergoes rapid globalization, businesses are taking active steps to transform their strategies and operational approaches to cater to the diverse requirements of their customers. This transformation is essential for fostering meaningful connections with customers in an increasingly interconnected marketplace [1]. As organizations venture into more markets across nations, dismantling geographical and cultural barriers, it becomes vital to focus on providing services in many languages for accessibility to not only enhance the overall user experience but also to boost customer satisfaction significantly, thereby opening doors to new markets for growth. As a result, multilingual applications, which were once seen as a nice-to-have option, are swiftly evolving into a requirement for success.

Multilingual support is especially important for applications aiming to engage a wider audience. Research conducted by the Common Sense Advisory reveals compelling statistics: 75% of consumers prefer purchasing products in their native language, and 60% of respondents rarely or never purchase from websites that offer content solely in English [2]. These findings underline the critical role of globalization in application development.

A multilingual application goes beyond a mere technical necessity; it represents a strategic imperative that elevates user experience, embraces inclusivity, and drives market expansion. In some cases, application translation is not just beneficial; it may be mandated by law, particularly in countries like Canada and Switzerland, where regulations stipulate that applications be offered in multiple languages [3]. This need is further underscored by multinational corporations such as Amazon, which operate across various regions, as well as international organizations like the United Nations and the European Union, which require rich multilingual features within the application. The need for multilingual applications could be even more significant in rural and elderly populations English is not the primary language in a given region.

APEX stands out as a powerful tool for developers in this context, offering a low-code environment that enables the creation of scalable applications equipped with integrated multilingual features. This paper delves into the tools available within APEX for effective localization and shares best practices to ensure the successful implementation of multilingual applications. By gaining a deeper understanding of the methodologies and challenges involved, developers can craft applications that not only perform optimally but also resonate deeply with a global audience, reflecting the rich tapestry of linguistic and cultural diversity.

Overview of Apex

APEX is a cloud-based, low-code development platform that enables users to create robust applications quickly and efficiently. It is hosted with an Oracle database, making it especially suitable for data-centric web-based applications. By providing a declarative framework, the APEX platform allows developers to concentrate on application logic rather than getting bogged down in complex coding.

Globalization Features and Capabilities in APEX

APEX has supported globalized applications since its first release [4]. The two essential aspects of globalization are Translation and Localization. While translations allow the application to run in different languages without duplicating the logic, localization displays the application's content in the proper format based on the location of the end user [4]. APEX platform allows developers to effectively handle these two aspects when creating multilingual applications using the following features and capabilities:

Defining Application Languages

Developers have the flexibility to seamlessly integrate multiple languages into their applications, ensuring that every necessary language for translation can be easily added.

Seeding and Publishing
This powerful feature automates the generation of all translatable text, drawing upon the array of languages that have been selected for the application. This streamlines the localization process significantly.

Translation Repositories
A centralized repository acts as a vital hub for all translations, preserving crucial application metadata. This includes essential elements such as page headings, report columns, and internal APEX texts, making managing and updating translations easier.

Dynamic Translations
With this innovative feature, developers can translate any relevant data stored within lookup and transaction tables, allowing for a more comprehensive and adaptive translation experience.

Language Switcher
This user-friendly feature lets users easily switch the application's language preference in their current session, enhancing accessibility and user experience.

Responsive Design
APEX's responsive design capabilities ensure that the application's layout adapts according to the document's direction—whether left-to-right or right-to-left—based on the chosen language [5]. This feature guarantees that the application maintains its usability and aesthetic appeal across different languages.

Automatic Language Detection
This intelligent feature allows APEX to automatically identify and switch to a user's preferred language based on their browser settings and personal preferences, providing a tailored experience without the need for manual adjustments.

Collectively, these features significantly enhance the development process for multilingual applications on the APEX platform, making it easier to reach diverse audiences effectively and efficiently.

Methodology
Based on the version used, APEX supports almost all languages worldwide. The list of all the supported languages is available in the feature of defining the application languages. Translating the application to different languages is based on so-called shadow applications. First, the primary or main application is developed in its primary language (the default language, English), and then internally, a copy of the primary application is created for each added language and is mapped in the application metadata in the apex instance schema.

APEX, depending on the version utilized, has the capability to support nearly all languages spoken around the globe. A comprehensive list of supported languages can be found within the feature that defines application languages for users looking to implement multilingual applications. The process of translating an application into various languages relies on a method known as "shadow applications." These shadow applications are not embedded in the schema metadata and are not available in the workspace application builder.

Initially, the primary or main application is constructed in its original language, which typically uses English as a default language. Once this foundational version is developed, a duplicate (shadow) of the main application is created for each additional language intended for use. This duplication is mapped within the application metadata in the APEX instance schema, ensuring each language version correctly aligns with the main application structure. This systematic approach facilitates a seamless translation process, enhancing the application's accessibility to a global audience.

The application can be configured to operate in multiple languages by following a series of detailed steps:

Define Globalization Parameters
To start, it is essential to establish the globalization parameters tailored to your platform's version. This involves configuring several key attributes, including:
- Primary Language: Select the main language the application will use.
- Document Direction: Specify whether the text direction is left-to-right or right-to-left.
- Date Formats: Choose the format in which dates will be displayed.
- Date Time Formats: Set the appropriate display format for date and time.
- Timestamp Formats: Configure how timestamps should appear.

These settings, located in the globalization attributes subsection of the Globalization section in the shared components of the primary application, will automatically apply to all pages within the application, ensuring a consistent user experience.

Define Application Languages
Next, in the application translation subsection of the Globalization section, all the languages to which the application can be translated must be added. This can be done through the "Define Application Languages" option. When doing this, ensure that you accurately enter:
- Language: Select the corresponding language
- Application ID: Enter a unique application ID for this shadow application
- Document direction: Select the document direction in which the app pages must be rendered when translated to this language.
- Image directory for that language if different than primary applications image directory.

This vital configuration information is stored in the WWV_FLOW_LANGUAGE_MAP table within the apex instance schema, allowing seamless language management.

Application Seeding
In Once all necessary languages are integrated, it is time to seed the application's metadata [6]. This includes various elements such as report names, column headers, page item labels, static content in regions, and help text. Collectively termed "translatable text," this content must be populated into the translation text repository using the Seed and Publish option within the application translation subsection.

Translatable Text Management
In After generating the translatable text in the repository, updating this content with the corresponding translated text is crucial. There are two primary methods to accomplish this:
- Using XLIFF Files: APEX supports the XML Localization

Interchange File Format (XLIFF), a standardized way to exchange localization data. You can download all the translatable text into an XLIFF file specific to a language via the "Download XLIFF translation file" option. This allows developers to collaborate with professional translators without needing workspace access, as translations can be done directly within the XLIFF files. Once the translations are finished, you can easily re-import these files using the "Apply XLIFF translation files" option, which will automatically update the translation repository by mapping the translated text to its relevant components [6].

- Manual Updates: If required, you can also manually update each record within the "Translation Repository" section of the Globalization area. However, it is worth noting that this process can be time-consuming. An alternative is to generate and execute scripts to efficiently update the translate to column within the WWV_FLOW_TRANSLATABLE_TEXT$ table in the apex instance schema.

Dynamic Translations

While static application content can be translated through the previously discussed translation repository, it is equally important to consider dynamic translations for business-specific data. This might include listings of values, lookup references, display values for reference codes, or any relatively static metadata in the application's parsing schema in the database. Dynamic translations can be added via the "Translation Utilities" subsection of the Application Translations section. Subsequently, the APEX_LANG API can be utilized to display these translations in real-time, depending on the user's current language setting.

APEX Internal Text Translations

In For language translations not officially supported by APEX, internal system messages—like those seen in interactive reports or grid options, notifications in success or error regions, or various other system-generated messages—will not automatically translate [7]. All such texts are accessible for translation within the "Text messages" option in the Translation Utilities subsection. Reliable external repositories or tools containing pre-translated internal texts in multiple languages can be leveraged to streamline this process.

Programmatical Text Translations

Translating programmatic text messages added to dynamic content regions or JavaScript functions is also advisable. Developers can integrate these messages into the "Text messages" section by assigning each a static name for every language, allowing for their use within JavaScript as well.

Language Switcher Implementation

Integrating a language switcher is a necessary feature that allows users to toggle their language preferences throughout the current session. This switcher can be a list component, a list of values component, a radio button group, or a select list component. It is ideal to place this switcher prominently, often in the navigation bar or menu, so that it is easily accessible across all pages within the application. When a user selects a language, the global parameter FSP_LANGUAGE_PREFERENCE must be updated accordingly to reflect the chosen language code.

Publishing Application

Once everything is set up, publishing the application creates a distinct shadow copy of the primary application, replacing the default text strings with those from the translations table. This newly published application can then be deployed to present the application in various languages. The "Publish translated application" option in the Application Translations section allows this. Any changes made to the primary application will only be captured in the translated versions after reseeding and republishing through the workspace.

When deploying the application across various environments, exporting the complete application ensures that all associated translation metadata is included. This is essential for maintaining consistency in user interfaces across different language versions. However, if the deployment only involves specific components—such as individual pages, plugins, or shared components-there are additional steps to consider. After successfully deploying all the necessary component files, it is crucial to publish the application to ensure the latest updates are reflected in the translation applications.

In a runtime-only environment, publishing the application is achieved by programmatically invoking the APEX_LANG SEED_TRANSLATIONS and PUBLISH_APPLICATION methods. These methods help activate the newly deployed translations and make them accessible, ensuring that users see the most up-to-date content in their preferred languages.

```
declare
  v_app_id number := 100  –- primary application id
begin
  apex_lang.seed_translations (p_application_id => v_app_id,
                               p_language = ‘es’);
  apex_lang.publish_application (p_application_id => v_app_id,
                                 p_language = ‘es’);
end;
/
```

By following these comprehensive steps, the application will be fully equipped for multilingual support, providing a better experience for users worldwide.

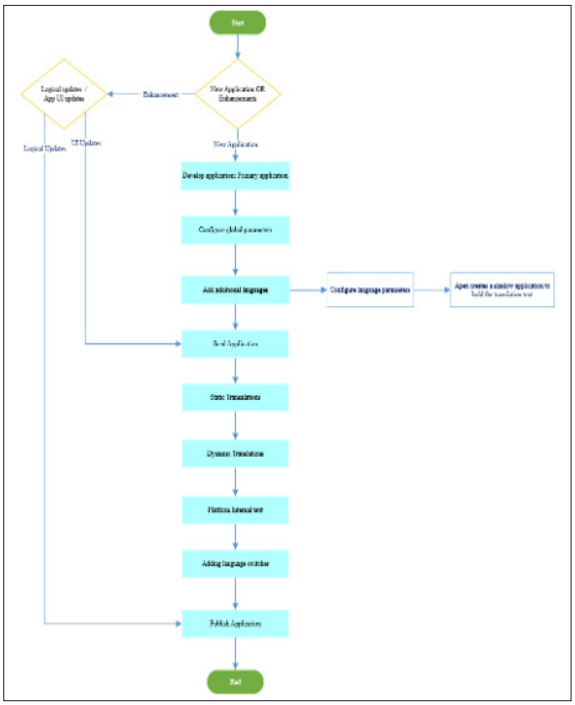

Figure 1: Process Flow of Globalization of the Application

Localizations

Sound localization is a multifaceted process that goes beyond merely translating words and text messages. It encompasses the creation of a comprehensive application experience that is both accessible and engaging for users hailing from a wide array of countries, regions, and cultures. Achieving effective localization requires a thoughtful and nuanced approach that considers the broader context of the application rather than relying solely on direct translations that may not capture the essence of the content.

To significantly enhance user experience across diverse geographic areas, the Automatic Time Zone feature can be enabled within the Globalization section of the application builder. This powerful feature intelligently derives the user's time zone from their web browser settings, which allows the application to seamlessly switch to the appropriate local language. Beyond language adaptation, this feature also facilitates the dynamic updating of various session parameters, including but not limited to date formats, time formats, timestamp formats, currency formats, calendars, and systems of measurement. All of these elements are tailored specifically to align with the user's local context, or the prevailing standards found within their country, ensuring a fluid user experience.

Furthermore, it is vital to accurately select the appropriate document direction that corresponds to the language in use—an aspect particularly important for languages common in Middle Eastern countries, where reading directions can differ significantly from those in Western languages. If the document direction is set incorrectly, users may encounter substantial challenges when navigating or interacting with the application, regardless of the translation's accuracy. To effectively tackle this challenge, Apex possesses the capability to automatically restructure the entire page layout and content based on the selected document direction for any given language. This ensures that users enjoy a seamless and intuitive interface, allowing for smooth navigation and interaction with the application's features and content.

Comparison with Google Translate

While it might appear straightforward to use a third-party API, such as Google Translate, to convert an app into another language, the results often fall short. Google Translate is a multilingual neural machine translation service that is provided by Google to translate text, documents, and websites from one language into another. Translation algorithms used by Google Translate may produce translations that may be meaningful but may not be as accurate as the original message based on the context. These differences can be noticed in many aspects by humans [8]. Google Translate tends to deliver basic, sentence based translations that lack depth and cultural context.

On the other hand, APEX Globalization offers a much more nuanced and comprehensive approach to translation. Its features extend beyond mere text conversion; they delve into the essential art of localization. This process creates a rich and inclusive user experience that resonates deeply with individuals from a variety of cultural backgrounds. APEX Globalization allows customization so that developers can integrate the distinct nuances of specific applications, languages, regions, and cultures.

As a result, the app is not just comprehensible but also feels relatable and relevant to its diverse audience, fostering a stronger connection with users. This attention to detail ensures that the app engages users on a more personal level, making it truly accessible to everyone, regardless of their cultural context.

The following table lists some differences between Google Translate and APEX globalization.

Table 1: Comparison between APEX Globalization and Google Translate

Sl.No	APEX Globalization	Google Translate
1	Server-Side Translation and Localization	Client-Side Translation
2	Fully customizable by the developer. Allows complete or partial translation down to lowest granularity, i.e., element within a page	Entire page will be translated. No option for partial translations
3	Text can be translated considering the context and app specific nuances	Sentence based translation. May lack contextual and cultural nuances in translations
4	Document direction can be configured for a given language	Document direction can’t be changed
5	Based on the language selected, session parameters like date formats, calendars, currency formats, etc., can be dynamically changed accordingly	Session parameters cannot be changed
6	Language can be switched dynamically based on the browser geolocation	Language should be changed manually
7	The developer can make changes to any text within the app	The developer has no option to change the translation text
8	Designed for applications where consistent user experience and localization are crucial	Ideal for quick translations, casual use, and understanding foreign text
9	Framework for building multilingual applications	Machine translation of text
10	Ideal for data centric web-based applications as the data integrity while globalization is maintained	Not ideal for data centric applications as it translates the data as well

Therefore, though Google Translate is an AI-driven, robust translation tool that is very robust and mostly accurate, conveying the intent of the text is not as simple as a simple word-to-word translation and presenting it to the end users. It is important to understand the audience and the nuances of their language [9].

Conclusion

The demand for multilingual and multimodal translation and localization is increasing with the development of globalization. Creating multilingual applications that effectively meet the diverse needs of users from various regions around the globe is a challenging endeavor. Nonetheless, the APEX platform stands out as an exceptional tool for developing such applications. With its robust suite of features and versatile options for translation and localization, APEX simplifies the complex process of reaching a worldwide audience.

By tapping into the rich array of compelling features and user-friendly options detailed in this article, developers have the opportunity to fully leverage the power of the APEX platform. This enables them to create secure multilingual applications that not only function seamlessly but also resonate meaningfully across various languages and cultural contexts.

Acknowledgment

Author would also like to disclose the usage of Grammarly (AI) tool for editing and grammar enhancements.

References

1. Onoufriadis N (2023) "Nikolas onoufriadis," Medium, 12-Oct-2023. Available: https://nikolasonoufriadis.medium.com/nikolas-onoufriadis-the-impact-of-globalization-on-international-business-strategies-4aad5d41c73c.
2. DePalma DA, Sargent BB, Beninatto RS (2006) Can't Read, Won't Buy: Why Language Matters on Global Websites. Lowell, MA, USA: Common Sense Advisory, Inc. https://www.marioncaris.com/wp-content/uploads/2011/10/Cant-read-wont-buy_2007.pdf.
3. Staniszewski P (2022) Application localization – how to make your Oracle APEX app global in 30 minutes." Pretius. Available: https://pretius.com/blog/apex-apllication-localization/.
4. Gault D (2015) Expert oracle application express, 2nd ed. New York, NY: APRESS, 2015.
5. Oracle (2023) App Builder User's Guide. Oracle Help Center. https://docs.oracle.com/en/database/oracle/apex/23.2/htmdb/understanding-the-translation-process.html#GUID-76786C7A-1A9E-4372-B78F-5B22AEED64B7.
6. Oracle (2023) App Builder User's Guide: Managing Application Globalization. Oracle Help Center, https://docs.oracle.com/en/database/oracle/apex/23.2/htmdb/managing-application-globalization.html.
7. Oracle (2023) App Builder User's Guide: Translating Messages Used Internally by APEX. Oracle Help Center. https://docs.oracle.com/en/database/oracle/apex/23.2/htmdb/translating-messages-used-internally-byapex.html.
8. Mathayomchan B, Sripanidkulchai K (2019) Utilizing Google translated reviews from Google maps in sentiment analysis for Phuket tourist attractions. in 2019 16th International Joint Conference on Computer Science and Software Engineering (JCSSE) 260-265.
9. Schooley S (2019) How to Avoid International Marketing Mistakes - businessnewsdaily.com. Business News Daily, 12-Aug-2019. Available: https://www.businessnewsdaily.com/5241-international-marketing-fails.html.