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TEACHING JAPANESE ONLINE – A SYSTEM CONCEPT

Introduction

The knowledge of foreign languages is crucial if one wants to function in today's world. Even such exotic language as Japanese has been increasingly gaining in popularity. In order to learn this language it is worth using e-learning, which includes technologies that facilitate learning all aspects of a foreign language such as pronunciation, grammar, writing, reading and listening comprehension. Online technologies make it possible to present and share various data and consequently they are a convenient e-learning tool. Thus, it is feasible to develop a functional e-learning platform to learn Japanese with the use of its power.

The article discusses a concept of a system to support teaching Japanese for JLPT[1] (*Japanese Language Proficiency Test*), which includes the check of vocabulary, the knowledge of characters and grammar. The objective of the system is to support the two key processes in teaching: the provision of knowledge and learning.

The paper will present the initial stages of the application development in line with the principles of software engineering, starting with the problem analysis and the determination of the responsibility range. It will discuss the main groups of the system users, their roles in the system and the mode of action. This will constitute the starting point for further work aiming at the implementation of the presented system concept.

1. Domain analysis

The objective of the system in question is to support teaching Japanese as regards vocabulary, characters and grammar. The project covers three areas: learning Japanese, e-learning and the use of online applications. As the concept is based on e-learning, the assumption is that the knowledge is provided by a website application that constitutes the source of information and presentation. Teaching, also in the case of e-learning, involves two parties: the teacher and the learner; and the application should support both of them. The teacher's role

[1] JLPT Japanese Language Proficiency Test, http://www.jlpt.jp/

is played by an autonomous system; however, as the system should be provided with adequate resources, there is a need for the participation of an expert in the field being taught - the Japanese language in this case. The expert's task is to develop a clear and convenient interface so that the database of topics is promptly developed and shared with the users.

The role of the learner is played by the target user who has the access to the application that covers categories corresponding to the particular parts of the JLPT exam. The learner selects whether his/her knowledge requires the use of all the categories or only the ones chosen with regard to the particular lack of knowledge. The user should have the access to the database of topics without the necessity to log in or register in order to be provided with any of the functions intended for his/her use. A free access to the application requires the implementation of security measures for the application and the data. For example, to avoid numerous automatic account creation, an e-mail activation option is introduced, while the logging procedure should involve the session maintenance option as well as the option to reset the password. An adequate authorization system should provide users with the access to their own data and prevent them from the access to the data of other users. A user that is logged-in should have the access to his/her own data and statistics as well as to the option for the selection of learning or checking the knowledge functions.

Japanese

The characteristic feature of Japanese is its exceptionally rich lexical system. The greatest dictionary has approximately 700 000 entries. The Japanese use actively three systems of characters: an abundant system of Kanji ideograms and two syllabaries: hiragana and katakana. They also use the Latin script that is referred to as romaji.[2] The most acute problem for the foreigners is posed by the complicated system of writing.

Kanji[3] are ideographic characters that were adopted from Chinese. A good command of Japanese requires the knowledge of about 2000 kanji characters out the system of approximately 50 000 characters. There are two ways of reading kanji: on-yomi (Sino-Japanese) and kun-yomi (Japanese) and within each of the kind of reading a particular character can be pronounced in a different way; consequently, it may have numerous meanings.

Hiragana[4] is a system of characters that represent Japanese syllabic values; it was developed as a result of the transformation of 50 kanji characters.

[2] Japanese-Polish Dictionary, ed. Aleksandra Kalinowska, Edgard 2011, ISBN: 978-83-62482-91-7
[3] Ibidem
[4] Ibidem

Katakana[5] is a system of characters that represent syllabic values that are similar to the ones in hiragana and at present it is used to write proper names, onomatopoeic words and contemporary borrowings from European languages.

Figures 1 and 2 present tables of hiragana and katakana

Figure 1. Table of hiragana

Figure 2. Table of katakana

Source: *KanaQuest - Hiragana and Katakana practice*, http://kanaquest.com

Japanese grammar is relatively simple and is mainly based on the modifications of the verb form. However, some practice is required to master all the forms. Japanese is a SOV language (subject-object-verb). As the majority of European languages use the SVO order, the Japanese word/sentence order may pose some problems[6]. The pronunciation is based on the phonetic reading of the hiragana syllables and this is why the knowledge of syllabaries makes it possible to pronounce correctly Japanese sentences already at the initial stage of learning. The same case is with listening comprehension – thanks to the unambiguous pronunciation it is not difficult to understand spoken sentences.

Nevertheless, the borrowings from other languages, which are frequent especially in modern words, may cause some troubles. This refers to foreign words that are transformed to the form that can be written with the application of the katana syllabary. They do not always resemble the original words but some practice makes it possible to learn the scheme of

[5] Ibidem
[6] Wikipedia, https://pl.wikipedia.org/wiki/Język_japoński

transformations, which helps to decipher the words.

The knowledge of English is helpful as most of the contemporary borrowings come from this language and there are similarities in the pronunciation of sounds.

The Japanese Language Proficiency Test (JLPT)[7] is the only standard and official Japanese language proficiency exam. It is held twice a year on five levels of proficiency: from N5 (the lowest) to N1. It checks the knowledge of vocabulary, writing system, grammar, reading and listening comprehension. It has the form of a multiple choice test.

2. System assumptions

As regards the area of the language, the current version of the design is restricted to the first level of JLPT (N5). The linguistic competence required for this level includes:

- writing: hiragana, katakana and about 100 kanji signs,
- vocabulary: approximately 800 words and expressions,
- grammar: present/past tense, past tense (long and short forms) and a dozen or so of minor structures.

The transfer of knowledge will be divided into two categories: teaching and learning. As regards teaching, the project should allow for the management of the resources from the database of topics, i.e. for adding, editing and deleting the resources.

As regards the learner, the system should be responsible for the presentation of the resources provided. They should be presented in the way that will enable theoretical and practical practicing of language topics with the consideration of the uniqueness of Japanese script. Learners should have the opportunity to record and keep track of their progress by doing tests and conducting the statistics of the level of material they have mastered.

The web application is the core of the whole project and it constitutes the platform where all e-learning assumptions will be put into practice. For the sake of resource management, in order to store the business data, the application should include an application server that is connected to the database. The client should dispose of an interface so that the user who has the knowledge of Japanese can add, edit and delete resources. Additional options to change the resources in the database should be protected against the access of unauthorized users.

The application should serve the learner who is its target user by an adequate presentation of resources that are stored in the database. The resources should be presented comprehensively,

[7] JLPT Japanese-Language Proficiency Test, http://www.jlpt.jp/

with the consideration of mutual relationships in a clear and well-organized way.

The application should be accessible through the Internet so, consequently, the application server should be able to serving simultaneously numerous users.

3. System concept

After the analysis of the existing solutions and on the basis of the conclusions from the experience of one of the authors in learning Japanese through e-learning [7], the opportunity to develop a Japanese learning support application that would allow for practicing the theoretical aspects of the language and adding new materials has been noticed. The project assumes the development of an online application that is accessible on the website.

The existing solutions in the field of e-learning as well as the solutions used in learning Japanese online were reviewed and conclusions were drawn as regards their compatibility with the result of the problem analysis. Consequently, appropriate elements were selected that would help develop the new application that should meet the analysis assumptions in the best possible way.

The SAKE WSZiB[8] system was the inspiration in terms of the system availability. Only one of the authors of the project has only a basic knowledge of Japanese and the participation of an expert in this field is required. On the other hand, such an expert does not have the knowledge in application development. Consequently, the application requires an interface for the expert to be able to add new materials and replenish the knowledge base. An authorized user will be able to add theoretical information and develop tests.

As regards the presentation, the application will resemble the *japonka* service[9]; however, more emphasis will be put on the testing part as it is done in *Obenkyo*[10]. The knowledge will be divided into subjects that will constitute of small portions of material easy to acquire in a single step (e.g. a group of kanji characters or a grammatical problem). It will also be possible to look through the whole material and to create own topic groups. Tests will play a significant role; they will function on the same principle as knowledge presentation, i.e. a division into subjects and learner's own compilations of topics will be accessible.

The application will be widely available; however, there will be an option of registration and logging. For users who are logged-in, the statistics of the knowledge level gained will be conducted. A similar solution is applied in the *Obenkyo* application. The presented system will

[8] SAKE, sake.wszib.edu.pl/dydaktyka
[9] Kurs japońskiego (Japanese language course) , www.japonka.pl
[10] Obenkyo – Android Apps, https://play.google.com/store/apps/details?id=com.Obenkyo&hl=pl

record all test results and particular answers in order to enable the assessment of the performance level and the selection of topics that require more effort.

The database will store the description of topics, the registered users as well as the data connecting the users to the topics. When developing an application, one should have in mind that it ought to be clear, user-friendly and reliable.

In conclusion, the proposed concept of the application to support teaching Japanese assumes the use of the best available solutions together with the authors' suggestions and the latest trends and technologies in the Internet application development and website presentations, which will result in gaining an optimal solution to the problem in question.

1. Characteristics of the system users

Every identified group of users can be referred to as the system actors who will be used in the course of the next stage of the project. The issue of users also involves the questions of authorization, authentication and data protection.

Learner

The learner is the target customer who uses the application and is motivated to learn Japanese by browsing materials and doing tests. He/she can open an account, browse the materials, solve tests and – when logged-in – learner has the access to the test results statistics.

Japanese language expert

The expert is responsible for the provision of knowledge to the application in the form of forms and tests. He/she has an account created by the administrator, which enables logging into the content management panel.

System administrator

The administrator takes care of the order of the data in the application. He/she can add, edit and delete all of the resources and creates the accounts for the experts. The task of the administrator is also to detect and remove errors, to add and test new functions as well as optimize the application.

User-related security issues

Both the expert and the ordinary user accounts require the development of an authentication mechanism[11]. The learner/user should have the possibility to create an account

[11] Hartl Micheal, „Ruby on Rails Tutorial", http://railstutorial,org, 3rd edition, chapter 9.2 Authorization

and to log into the existing account with the use of login and password that are given during the registration. The expert accounts can be created only by the administrator who can assign adequate rights to the experts. The administrator account is created in the course of the implementation and there is no possibility to create a new administrator account or to assign the administrator's rights to any of the users.

For security reasons, the passwords should be encrypted. For the sake of protection against automated attempts to create user accounts, a registration confirmation system should be introduced and captcha techniques[12] should be applied to identify the user/ a human being.

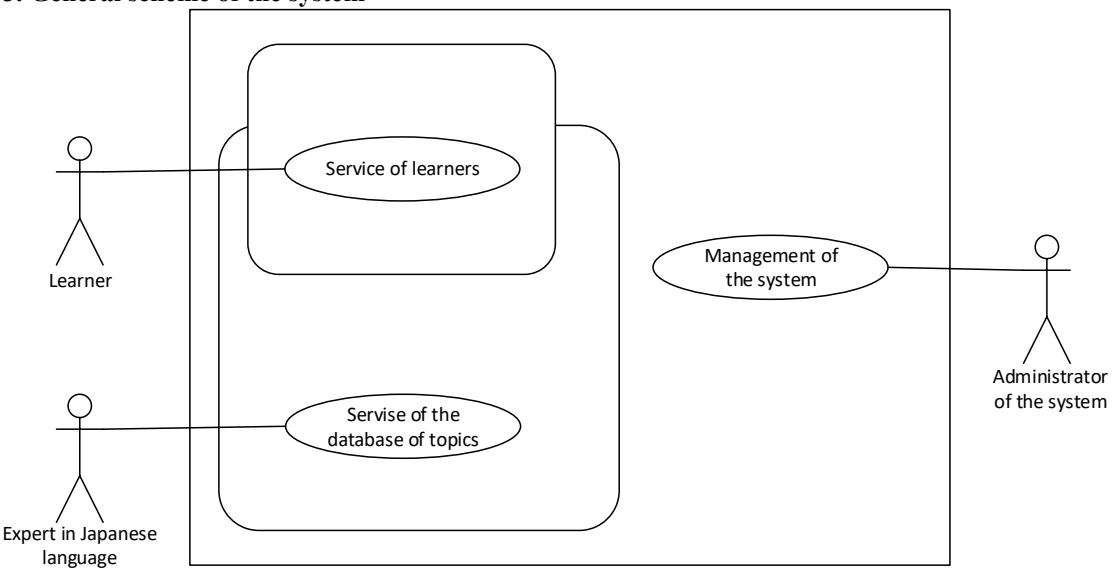
5. Requirement model

The system under design can be divided into subsystems in relation to the service to particular users that are identified as the system actors and described with the use of adequate use case groups. The separated subsystems are:

- service of learners
- service of the database of topics
- system management

Figure 3. presents a schematic structure of the system and interactions between the subsystems.

Figure 3. General scheme of the system



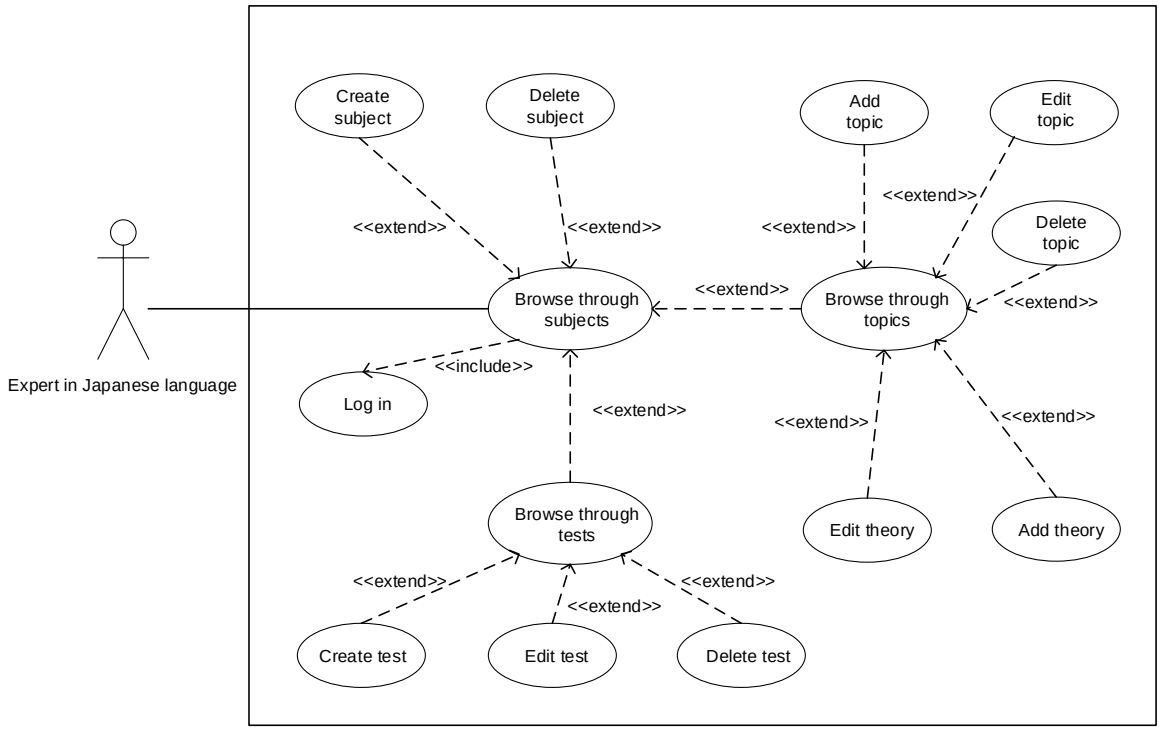
Source: Authors' research

[12] CAPTCHA – Wikipedia, https://pl.wikipedia.org/wiki/CAPTCHA

A use case diagram compliant with the UML standard[13] has been developed for each subsystem as well as a description in the form of scenarios for each use case based on the Cockburn's proposal[14]. Figure 4 presents an example of a use case for a service subsystem of the database of topics that is used by the expert.

The database of topics includes topics that are grouped in broader categories referred to as subjects. The database includes also subject-related tests that are developed for topics which are selected within particular subjects.

Figure 4. Use case diagram - service of the database of topics



Source: Authors' research

The functional analysis resulted in an outline of all functions of the system in question [7]. The model of the learner's service subsystem is given in Fig.5 in the form of a use case diagram and an exemplary scenario is presented for UC-5: "create test" in order to illustrate particular functions that enable learner developing tests on their own.

UC-5 Create test
Objective: Development of a test.
Context: Development of learner's own tests in accordance with the mastery level of the topic.
Main actor: Learner.
Initial condition: Learner is registered in the system.
Trigger: Learner logs in and selects "develop test" option.

[13] Wikipedia - Unified Modeling Language, https://pl.wikipedia.org/wiki/Unified_Modeling_Language
[14] Cockburn Alistair, „Writing effective use cases", Addison-Wesley 2008, ISBN: 0-201-70225-8

The main success scenario:

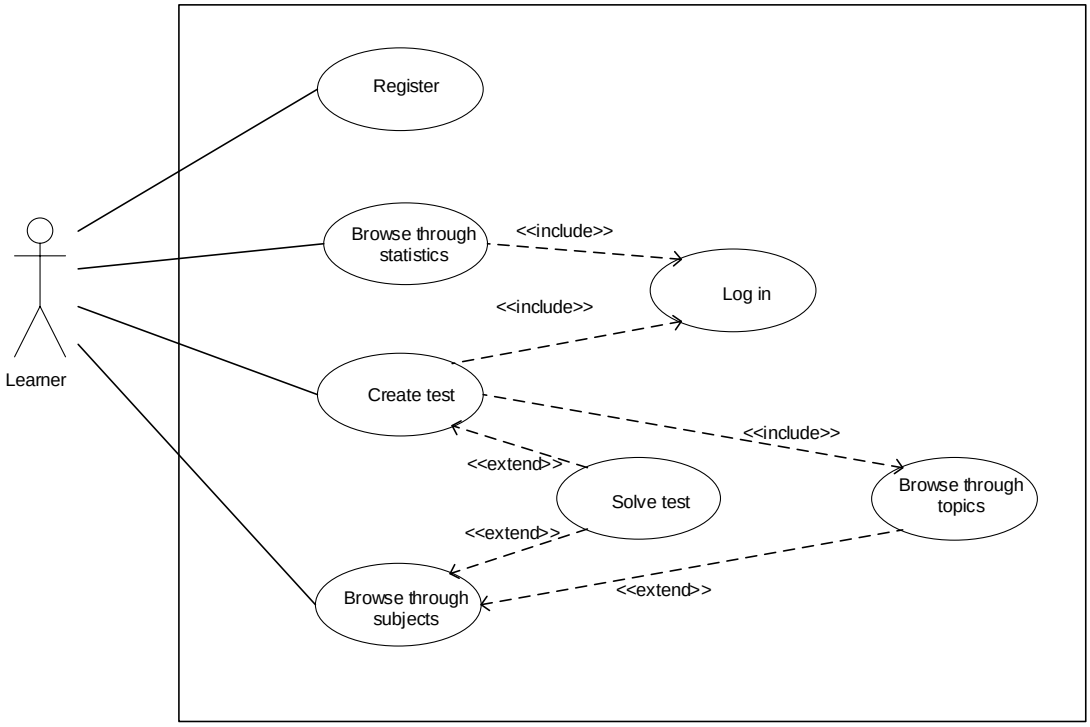
1. *Learner logs into the system*
2. *Learner browses topics and selects the appropriate ones.*
3. *The application develops a set of questions related to the selected topics.*
4. *Learner solves the test.*
5. *The application presents the test results*
6. *The topic statistics are updated.*

Alternative scenarios:

3.1 Learner stops the test.

3.2. The application does not present the results and directs the learner to the topic site.

Figure 5: Use case diagram – service of learner



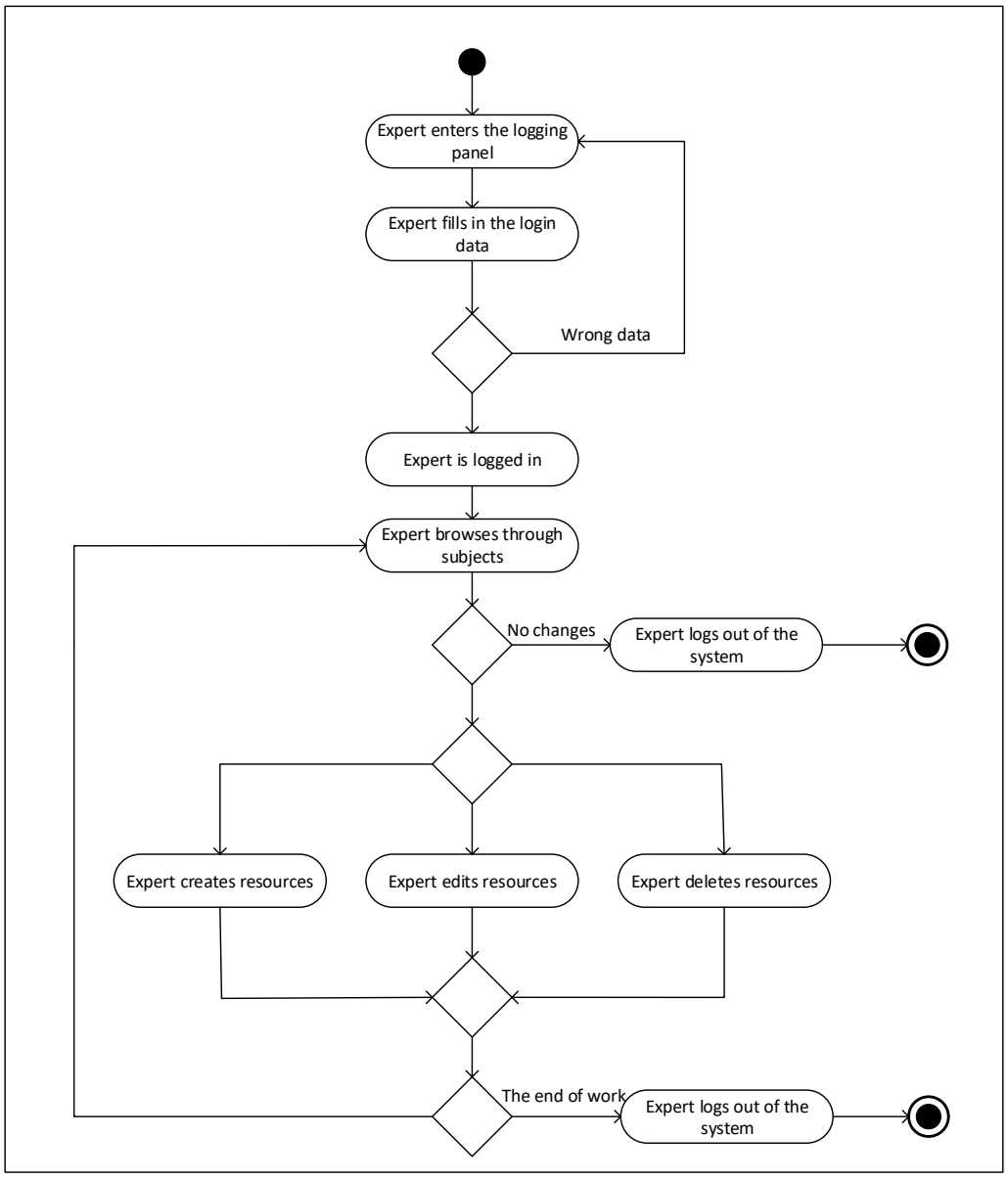
Source: Authors' research

6. Elements of the system design

As a result of the analysis of use cases for the three subsystems in Fig.3, three activity diagrams were developed for the main actors of the subsystems: the learner, the Japanese language expert and the system administrator. Details concerning their activities that are modeled with the application of activity diagrams are included in [7]. Figure 6 presents an exemplary activity diagram of one of the actors – the Japanese language expert. Every operation is started by logging into the system. There are two exit points and they are preceded by logging out of the system. The first termination concerns the case where no changes were introduced, while the other one considers the introduction of changes. The loops between operations

indicate that the changes to the resources may be done several times before logging out is performed. For the sake of clarity of the model, one substitute term *resources* was used to refer to the three types of objects that appear in the management service subsystem: *subjects*, *topics* and *tests*. In all three cases the operations *create*, *edit* and *delete* are conducted identically.

Figure 6: Activity diagram for the user/expert



Source: Authors' research

Conclusion

The article presents the concept of an online Japanese language learning system. The issue under investigation concerns three areas: learning a foreign language that is exotic to the European learner, the application of e-learning methods and the use of the Internet applications. It determines a set of functional requirements concerning three groups of users: a learner, an

expert and the system administrator. Functional requirements were modelled with three subsystems that provide functions to the system actors. A draft system project is given as regards the expert's operations. The solutions constitute the basis for the development of an online system that meets the conditions of the presented concept.

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Abstract

The article presents a concept of an online system to support teaching Japanese and to prepare to the JLPT examinations. The objective of the system is to fill the niche in the area of e-learning software for teaching exotic foreign languages to Europeans. The paper presents the initial stages of the application development, the description of the problem area and its analysis with the consideration of the requirement model as well as the selected elements of the functional part of the system. Within the framework of the research that was described generally in the article, a complete project and the implementation of the system was developed whose description may constitute a follow up of the presented conceptual considerations.