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(54) Title: DEVELOPMENT ENVIRONMENT FOR ONLINE PLATFORMS

(57) Abstract: A development environment for online platforms comprises a data persistence layer, a software library, and a graphic interface. The data persistence layer is configured to store a plurality of data and a plurality of graphic elements, the software library comprises a plurality of functions configured to process and/or to retrieve at least a portion of the plurality of data and the graphic interface is configured to generate a graphic representation of the data processed and/or retrieved by means of the functions, assembling the graphic elements recursively. Furthermore, the data persistence layer, the software library and the graphic interface are programmable individually and autonomously, in particular by applying a metalanguage, specifically the metalanguage PONGO®, defined by a plurality of markers, each of which is configured to uniquely identify and retrieve at least one among a respective function or graphic element or portion of the plurality of data.

Development environment for online platforms

DESCRIPTION

Technical field

The present invention relates to the technical sector of data management systems and methods.

In particular, the present invention relates to a development environment for online platforms which is advantageously applicable for the creation of multipurpose computing products and services on classic and more modern technologies.

Prior art

In the current landscape there are specific products which address certain distinct aspects related to business digitalisation.

The main solutions currently on the market variously address different issues related to the management of material resources, information, customer relations, projects within a company.

The processing and management activities of sensitive data (GDPR Privacy) are also critical.

Furthermore, due to the increasingly widespread dissemination of low-cost smart devices and consumption in the IoT field, the processing of the information received has become crucial, through Big Data, Machine Learning and Deep Learning analysis techniques.

This fragmentation entails considerable disadvantages in terms of inefficiency in that it makes it substantially impossible to acquire an overview and significantly limits the dissemination speed of information within the company, since the various products operate in sealed compartments and there is no guarantee that the processing obtained from one of them is accessible or even processable by a different product.

Furthermore, the use of separate and distinct products inevitably requires the management of several different platforms, each characterised by its own specificities, which in order to be used correctly require the presence

of an expert user, who is able to explore and understand the correct functioning of each product.

To date, different features are provided by applying different development logics specifically aimed at the type of product to be created, making the development environments inflexible and inadequate to operate outside the specific scope for which they were designed.

In this context, the technical task underpinning the present invention is to provide a development environment for online platforms which obviates at least some of the drawbacks in the prior art as described above.

Object of the invention

In particular, an object of the present invention is to provide a development environment for more flexible, efficient and GDPR-compliant online platforms.

The defined technical task and the specified aims are substantially achieved by a development environment for online platforms, comprising the technical features set forth in one or more of the appended claims.

Detailed description of preferred embodiments of the invention

A development environment for online platforms according to the present invention is shown comprising a data persistence layer, a software library, a graphic interface and a metalanguage, in particular such a metalanguage is the metalanguage PONGO®.

The data persistence layer is configured to store a plurality of data and a plurality of graphic elements.

The software library comprises a plurality of functions configured to process and/or to retrieve at least a portion of the plurality of data. It also allows the presentation of methods which can be retrieved through API calls of the REST type and/or GraphQL possible through token authentication mechanisms.

The graphic interface is configured to generate a graphic representation of the data processed and/or retrieved by means of the functions,

assembling the graphic elements.

The metalanguage PONGO® is adapted to interface the data persistence layer, the software library and the graphic interface.

Furthermore, the metalanguage PONGO® is defined by a plurality of markers.

Each marker is configured to uniquely identify and retrieve at least one among a respective function or graphic element or portion of the plurality of data.

The data persistence layer, the software library and the graphic interface can be programmed individually and autonomously.

Advantageously, the programming environment described herein provides a metalanguage by means of which it is possible to easily and efficiently make three distinct and individually programmable components communicate.

The dependent claims, incorporated herein by reference, correspond to different embodiments of the invention.

Further features and advantages of the present invention will become more apparent from the following indicative, and hence non-limiting, description of a preferred, but not exclusive, embodiment of a development environment for online platforms.

For the purposes of the present description, the term development environment is intended to define the set of resources which allow a user to generate and define a computer product, by means of which it is possible to process and make data accessible.

In particular, the development environment presented herein is usable for the creation of online platforms, or software available online and capable of allowing the user to access a plurality of distinct functions by means of which to display and/or manipulate data of interest.

The platform can be made available on a dedicated local network (for example, a corporate network) or even by means of the internet.

Essentially, the development environment comprises a data persistence layer, a software library and a graphic interface which are programmable individually and autonomously as well as interfaced by means of a dedicated metalanguage, namely the metalanguage PONGO®.

Thereby the development environment allows to produce easily scalable platforms in which three distinct aspects of data creation/management, graphic interface management to display the data and management of the functions with which to manipulate the data are controlled autonomously.

In greater detail, the data persistence layer is configured to store a plurality of data and a plurality of graphic elements.

Such a data persistence layer can comprise and/or be made by means of relational data structures (SQL DataBase), non-relational data structures (MongoDB, Redis), physical files (XML, Excel, CSV).

Within the data persistence layer it is therefore possible to store all the elements necessary for the operation of the online platform which can be developed by means of the use of the development platform.

In fact, the plurality of data can comprise all the information of interest which, by way of example, can be defined in the company by lists of available resources (spaces, products, personnel or other), economic values (income, expenses, purchase and sales lists or other), management of sensitive data (GDPR), analysis and processing of data generated by IoT devices (Big Data analysis, Machine Learning, Deep Learning) operating mainly on LPWAN networks and in particular on LoRa/LoRaWAN protocol, management of terrestrial and/or satellite gateways, processing flows (incoming products, outgoing products or other) or in general any useful and interesting information for the correct operation of the company's activities.

The graphic elements can instead be used according to the methods which will be explored below to make the data of interest to a user accessible and easily interpretable.

In other words, by means of the graphic elements, the network platform allows a user to display at least a portion of the plurality of data.

Preferably, the plurality of data is encrypted and the display and/or modification of such data is protected by a token authentication process.

In other words, it is possible to control access to the plurality of data by means of a verification mechanism through which the identity of the user who wishes to perform the access is verified, which is performed only if the user is actually authorised to do so.

By way of non-limiting example, such an authentication process can be performed with a JSON web token (JWT) mechanism, in accordance with which a token (for example a password) is associated with certain privileges in the data persistence layer to access the plurality of data as well as to authorise their modification and the user is asked to provide such a token in order to access the corresponding privileges.

Preferably, the data persistence layer is a remote data persistence layer, preferably a remote data persistence layer with distributed architecture, even more preferably a computing cloud.

It is thereby possible to ensure access to the data persistence layer at all times, also and in particular remotely without the need to be physically in the same location where such a data persistence layer is physically located.

Preferably, the software library consists of middleware operating with .NET Framework and .NET Core consisting of noncompiled software components.

It is thereby possible to edit the Business Logic (specifically the functions) directly within the platform itself, displaying in real time the modifications made to both the data processing and the graphic layout.

In this context, the data persistence layer comprises for example a relational database, i.e., a data persistence layer which provides access to data which is enclosed in tables where each row has a unique identifier and the columns define a relational model between the data contained

therein (for example belonging to the same category) and the plurality of functions defines a relational database management system (RDBMS) configured to define, create, maintain and control access to the database and therefore to the information contained therein.

In general, therefore, the software library contains the list of instructions defining the operations which can be performed on the other elements contained within the data persistence layer, i.e., the plurality of data and also the plurality of graphic elements.

Operatively, the software library interacts with the graphic interface so that the latter generates a graphic representation of the data processed and/or retrieved by means of the functions contained in the software library, assembling the graphic elements contained in the data persistence layer.

The graphic elements can also be injected recursively within other graphic elements, allowing to create reusable components within different views.

In other words, by means of the graphic interface, the graphic elements are selected through which it is possible to display and show a user at least a portion of the plurality of data depending on how such data have been selected and/or processed by means of the functions of the software library.

Advantageously, the graphic interface is configured to automatically generate a different graphic representation as a function of the media used to access the resource, simultaneously exploiting the same database. Thereby, there is a clear separation between graphic representation and data management.

It is therefore possible, by way of non-exhaustive example, to provide a first graphic representation by assembling graphic elements adapted to define a web interface rather than a second graphic interface for both cross-platform and native mobile applications.

In other words, it is possible to associate the same functions and the same data with different display modes which the graphic interface defines as a function of the tool which will be used to access it.

Therefore, it is not necessary to prepare different redundant platforms to make the information accessible on devices of a different nature, but it is sufficient to apply different graphic representations on the same functions and on the same data, which will be independently and autonomously accessible as a function of the device used.

As discussed above, the data persistence layer, the software library and the graphic interface are manageable, programmable and modifiable autonomously and independently and this is made possible by the introduction of a metalanguage, specifically the metalanguage PONGO®, which allows them to be interfaced in a particularly simple and efficient manner.

The metalanguage PONGO® is defined by a plurality of markers, each marker being configured to uniquely identify and retrieve at least one among a respective function or graphic element or portion of the plurality of data.

Therefore, the metalanguage PONGO® defines a set of rules by means of which it is possible to identify and select the elements contained within the data persistence layer and which are common and understandable for all the essential components of the development platform.

In particular, the metalanguage PONGO® is defined by at least a plurality of language markers.

Each language marker is associated with respective portions of data and is configured to retrieve a function to determine a display language of the graphic representation and to determine the assembly by the graphic interface of graphic elements representative of the translation of the respective portion of data into the display language.

Operatively, the language markers can be used whenever a user must be shown a text translated into different languages within the platform.

By applying a language marker, it is therefore possible to indicate to the graphic interface to use the graphic elements corresponding to given languages to generate the graphic representation.

Thereby, the same functions applied to the same data allow to generate graphic representations in different languages without the need to rewrite or modify the functions to adapt them to the individual languages of interest.

Alternatively or additionally, the metalanguage PONGO® is defined by at least a plurality of content markers.

Each content marker is associated with respective graphic elements or combinations of graphic elements and is configured to retrieve a display function of graphic elements or combinations of graphic elements within the graphic representation.

Operatively, the content markers can be used whenever it is necessary to instruct the graphic interface to select certain graphic elements and how to assemble them to display the data retrieved and/or processed by the functions of the software library.

By applying a content marker, it is therefore possible to indicate to the graphic interface how to set up and combine certain combinations of graphic elements to define the graphic representation.

The content marker can recursively retrieve other content markers, generating a graph of content markers which are joined together to generate the final graphic content.

Alternatively or additionally, the metalanguage PONGO® is defined by at least a plurality of data markers.

Each data marker is associated with respective portions of data and is configured to retrieve a display function of such a portion of data in the graphic representation.

Operatively, the data markers can be used whenever a user must be shown certain data or a combination of data taken from the data persistence layer.

By applying a data marker, it is therefore possible to indicate to the graphic interface which data must be displayed within the graphic representation.

Advantageously, the data markers can be used in combination with the content markers so that the content markers indicate how and what is to be used to generate the graphic representation and the data markers allow access to the data to be taken from the data persistence layer to obtain such a representation.

In general, therefore, it appears that the use of the metalanguage PONGO® allows the exchange of information between the components of the platform to be managed, which can thus be kept individual and autonomous.

Advantageously, the development environment further comprises an administrative interface operable by a user to modify at least one of the plurality of data, the plurality of graphic elements, the plurality of functions and the plurality of markers.

The administrative interface is accessible only by means of an authentication procedure which uniquely identifies the user.

In other words, the modification of the platform structure generated by the development environment can only be obtained through a dedicated interface which can be accessed only after an authentication procedure in which it is verified that the user who wishes to make the modification is actually authorised to do so.

The present invention also concerns the general use of the metalanguage PONGO® for the online development of multipurpose platforms which allow a complete digitalisation of the company and/or the creation of platforms dedicated to the processing of data received from IoT devices operating on LPWAN network and in particular on LoRa/LoRaWAN protocol through Deep Learning algorithms, Machine Learning and Big Data analysis created directly within the software library.

It is also possible to develop, always with the metalanguage PONGO®, platforms dedicated to the remote control of more complex systems such as Terrestrial Gateways, Data Centres or systems in the aerospace sector (PILOT).

As described above, each marker is configured to uniquely identify and retrieve an element stored in a data persistence layer and comprising at least one among a graphic element, a portion of a plurality of data, or a function to be applied to the plurality of data, and to cause a graphic representation of said element to be generated by a graphic interface.

In particular, the development environment can be advantageously used to develop online platforms comprising at least one of the following modules: an enterprise resource planning (ERP) module, a content management system (CMS) module, a customer relations management (CRM) module, an internet of things (IoT) module, a project management module, an electronic invoice management module, a terrestrial gateway remote control module, a remote control module for aerospace applications (PILOT) and a sensitive data management module (GDPR).

Advantageously, the present invention achieves the proposed objects, overcoming the drawbacks complained of in the prior art by providing the user with an easily scalable development environment in which a single access point is provided through which to manage the persistence of the data, the graphic layout and the application logics which combine the data with the visual representation thereof in various areas as a function of the media used to access the resources.

CLAIMS

1. A development environment for online platforms comprising:

- a data persistence layer, for example relational data structures, non-relational data structures or physical files, configured to store a plurality of data and a plurality of graphic elements;

- a software library comprising a plurality of functions configured to process, preferably defining a business logic, and/or retrieve at least a portion of said plurality of data;

- a graphic interface configured to generate a graphic representation of said data processed and/or retrieved by means of said functions by assembling the graphic elements;

wherein the data persistence layer, the software library and the graphic interface are programmable individually and autonomously, said development environment further comprising a metalanguage, in particular the metalanguage PONGO®, adapted to interface the data persistence layer, the software library and the graphic interface, said metalanguage being defined by a plurality of markers, each marker being configured to uniquely identify and retrieve at least one among a respective function or graphic element or portion of the plurality of data.

2. The development environment according to claim 1, wherein the metalanguage is defined at least by a plurality of language markers associated with respective data portions and configured to retrieve a function for determining a display language for the graphic representation and for determining the assembly, by the graphic interface, of graphic elements representative of the translation of the respective data portion into said display language.

3. The development environment according to claim 1 or 2, wherein the metalanguage is defined at least by a plurality of content markers associated with respective graphic elements or with combinations of graphic elements and configured to retrieve a function for the display of graphic elements or of combinations of graphic elements in said graphic

representation; each content marker is preferably further configured to recursively retrieve further content markers, thereby generating a graph of content markers that are reciprocally connectible in order to generate the graphic representation.

4. The environment according to any one of the preceding claims, wherein the metalanguage is defined at least by a plurality of data markers associated with respective data portions and configured to retrieve a function for the display of said data portion in the graphic representation.

5. The environment according to any one of the preceding claims, wherein the plurality of data is encrypted and the display and/or modification of said plurality of data is protected by means of a token authentication process.

6. The environment according to any one of the preceding claims, wherein the software library comprises middleware operating with .NET Framework and .NET Core and comprising noncompiled software components so as to enable the Business Logic to be edited directly within the platform itself, with a real-time display of the modifications made both to the processing of the data and to the graphic representation.

7. The environment according to any one of the preceding claims, wherein the graphic interface is configured to generate a graphic representation depending on the type of media used, said graphic representation preferably comprising a first graphic representation generated by assembling graphic elements adapted to define a web interface and a second graphic representation generated by assembling graphic elements adapted to define an interface of a mobile application.

8. The environment according to any one of the preceding claims, wherein the data persistence layer can comprise a relational or non-relational database or physical files and the plurality of functions defines a system for controlling, creating and managing access to the data persistence structure.

9. The environment according to any one of the preceding claims,

comprising an administrative interface which may be used by a user to edit at least one among the plurality of data, the plurality of graphic elements, the plurality of functions and the plurality of markers, said administrative interface being accessible solely through an authentication procedure adapted to uniquely identify the user.

10. The environment according to any one of the preceding claims, wherein the data persistence layer is a remote data persistence layer, preferably a remote data persistence layer with a distributed architecture, even more preferably a computing cloud.

11. Use of a metalanguage defined by a plurality of markers for the online development of multipurpose platforms, each marker being configured to uniquely identify and retrieve an element stored in a data persistence layer and comprising at least one among a graphic element, a portion of a plurality of data or a function to be applied to said plurality of data and to cause the generation of a graphic representation of said element by a graphic interface.

12. The use according to claim 11 for the development of online platforms comprising at least one of the following modules: an enterprise resource planning (ERP) module, a content management system (CMS) module, a customer relations management (CRM) module, an Internet of Things (IoT) module, a project management module, an electronic invoice management module, a terrestrial gateway remote control module, a remote control module for aerospace applications (PILOT) and a sensitive data management module (GDPR).

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F H04L G06Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2016/118979 A2 (C3 AI INC) 28 July 2016 (2016-07-28) abstract paragraph [0074] - paragraph [0076] paragraph [0093] - paragraph [0106] paragraph [0151] - paragraph [0158] paragraph [0192] - paragraph [0197] paragraph [0248] - paragraph [0249] figures 1-6	1-12

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Bertolissi, Edy

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
T	Anonymous: "Milano Marketing Festival 2019 ¦ Cshark S.r.l. ¦ Piacenza", , 3 September 2021 (2021-09-03), XP055837929, Retrieved from the Internet: URL:https://webcache.googleusercontent.com/search?q=cache:tbCQs2mWYRYJ:https://www.cshark.it/article/milano-marketing-festival-2019-it+&cd=1&hl=en&ct=clnk&gl=it [retrieved on 2021-09-06] the whole document	
A	US 8 707 247 B2 (HILLE-DOERING REINER [DE]; SAP AG [DE]) 22 April 2014 (2014-04-22) abstract column 1, line 45 - column 2, line 18 figure 1	1-12
A	US 2008/001751 A1 (GIESEKE ERIC J [US] ET AL) 3 January 2008 (2008-01-03) abstract	1-12
A	Manuel Lemos: "MetaL - Metastorage Documentation", , 13 February 2011 (2011-02-13), XP055852052, Retrieved from the Internet: URL:https://www.meta-language.net/metastorage-documentation.html?printable=1 [retrieved on 2021-10-18] Introduction	1-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2021/056038

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016118979 A2	28-07-2016	CA 3128629 A1	28-07-2016
		EP 3278213 A2	07-02-2018
		US 2017006135 A1	05-01-2017
		US 2018191867 A1	05-07-2018
		US 2019265971 A1	29-08-2019
		US 2021263945 A1	26-08-2021
		WO 2016118979 A2	28-07-2016
US 8707247 B2	22-04-2014	NONE	
US 2008001751 A1	03-01-2008	US 2008001751 A1	03-01-2008
		WO 2007146707 A2	21-12-2007