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(54) SYSTEM FOR PUBLISHING EMBEDDED WEB APPLICATION WITH ATOMIC VERSION CONTROL

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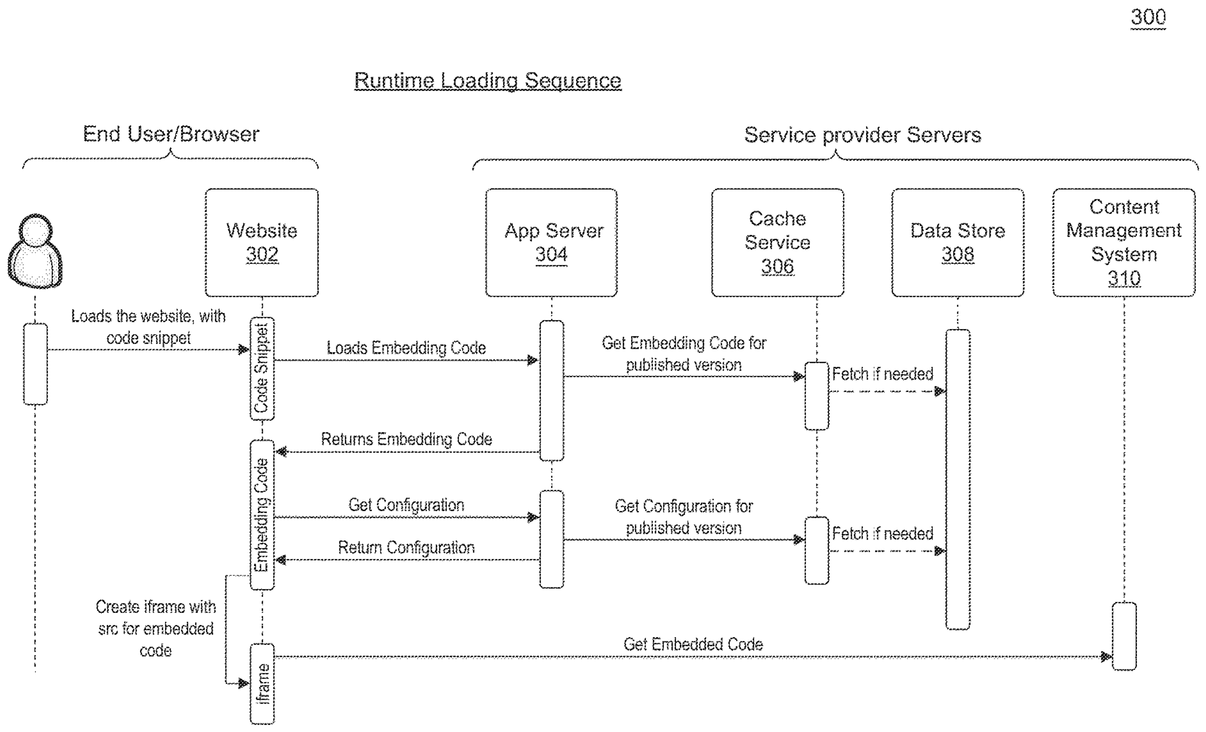
(57) ABSTRACT

Disclosed herein are system, method, and computer program product embodiments for publishing an embedded web application with atomic version control. An embodiment operates by generating an updated version of an embedded code in response to receiving a request to publish an updated embedded web application. The embodiment then generates an embedding code and an application configuration corresponding to the updated version of the embedded code in response to a determination that the embedded web application was published successfully. The embodiment then stores the embedding code and the application configuration.



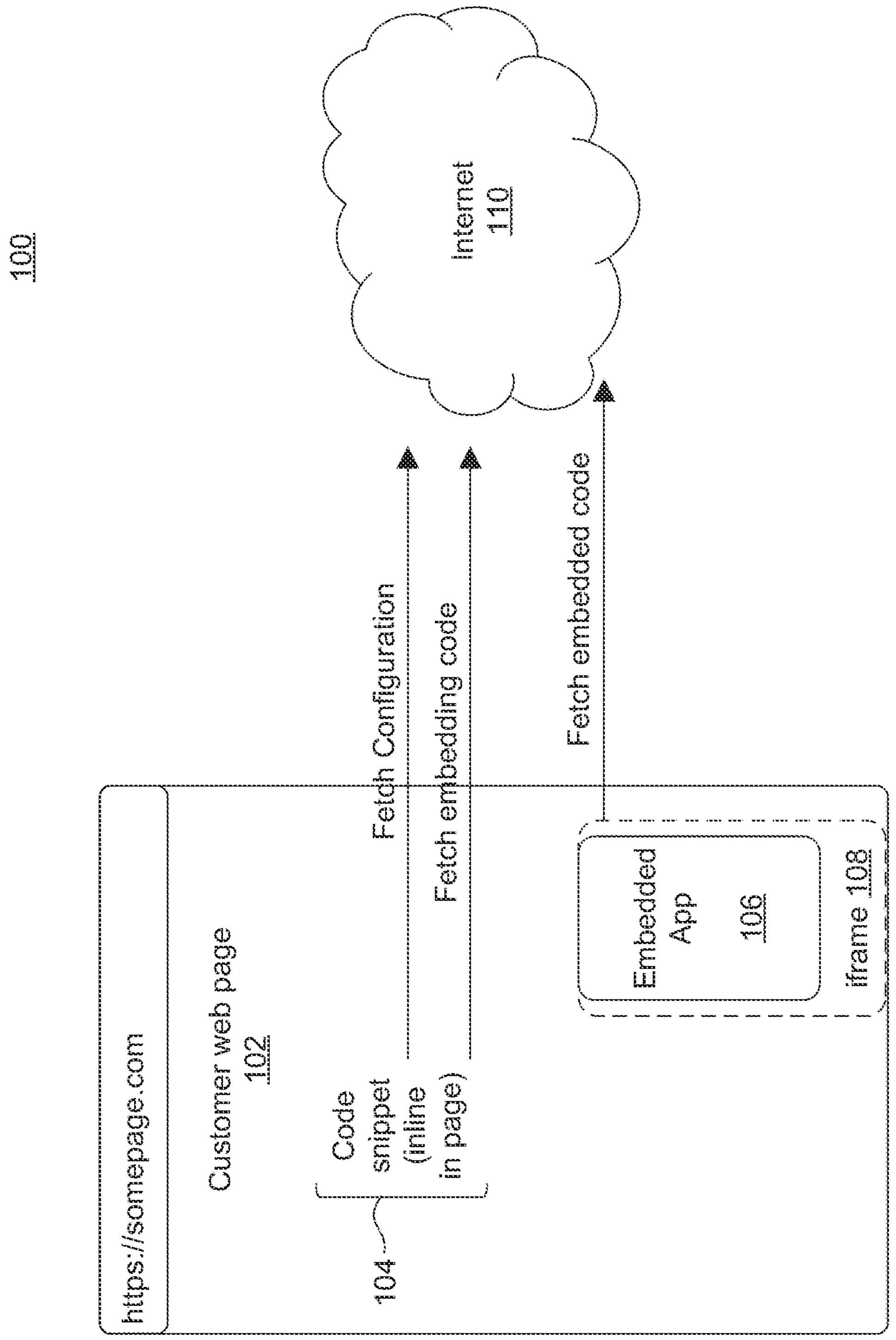

100
https://somepage.com
Customer web page 102
104
Code snippet (inline in page)
Fetch Configuration
Fetch embedding code
Embedded App 106
iframe 108
Fetch embedded code
Internet 110

FIG. 1

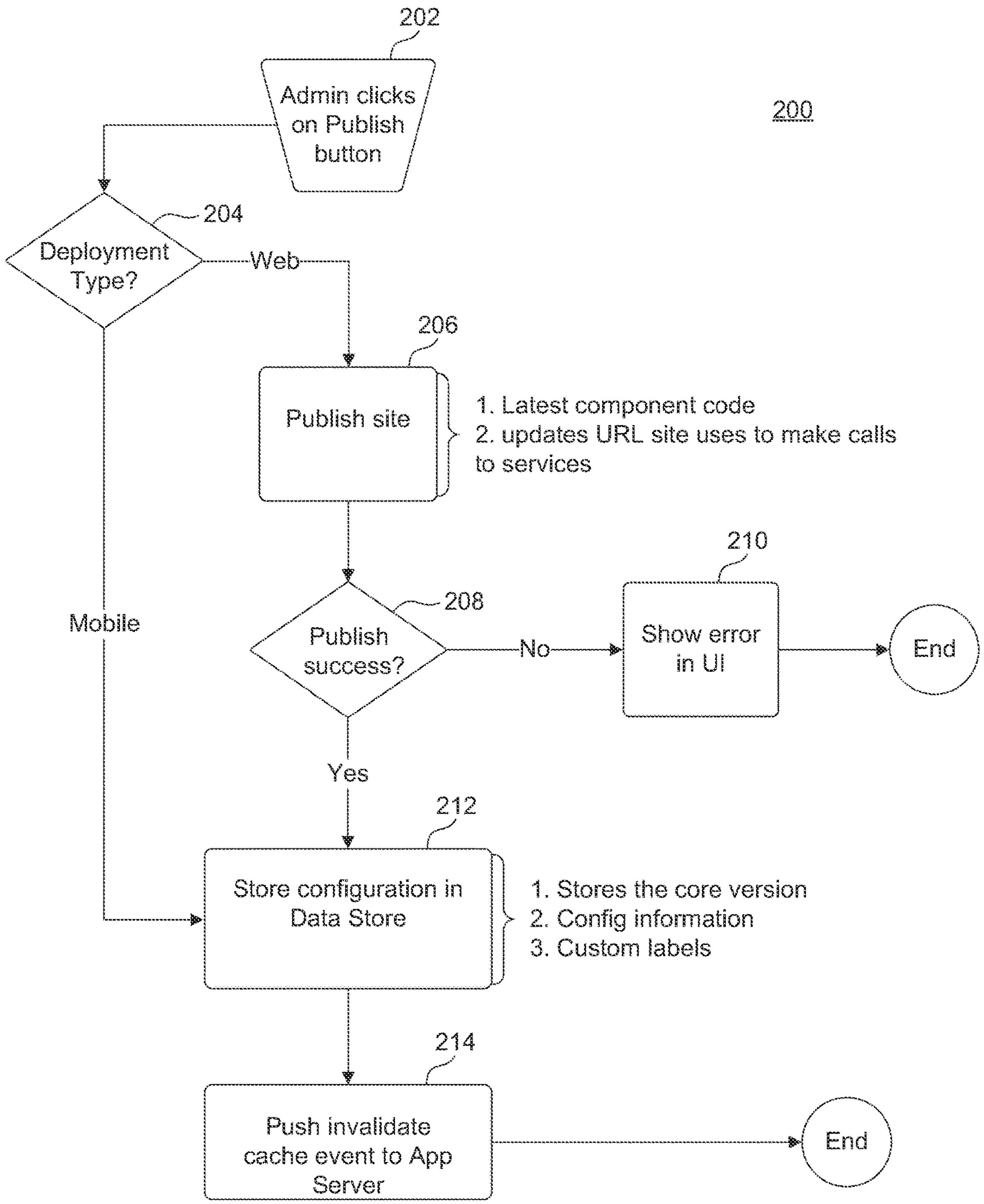

202
200
Admin clicks on Publish button
204
Deployment Type?
Web
206
Publish site
1. Latest component code
2. updates URL site uses to make calls to services
Mobile
210
208
Publish success?
No
Show error in UI
End
Yes
212
Store configuration in Data Store
1. Stores the core version
2. Config information
3. Custom labels
214
Push invalidate cache event to App Server
End

FIG. 2

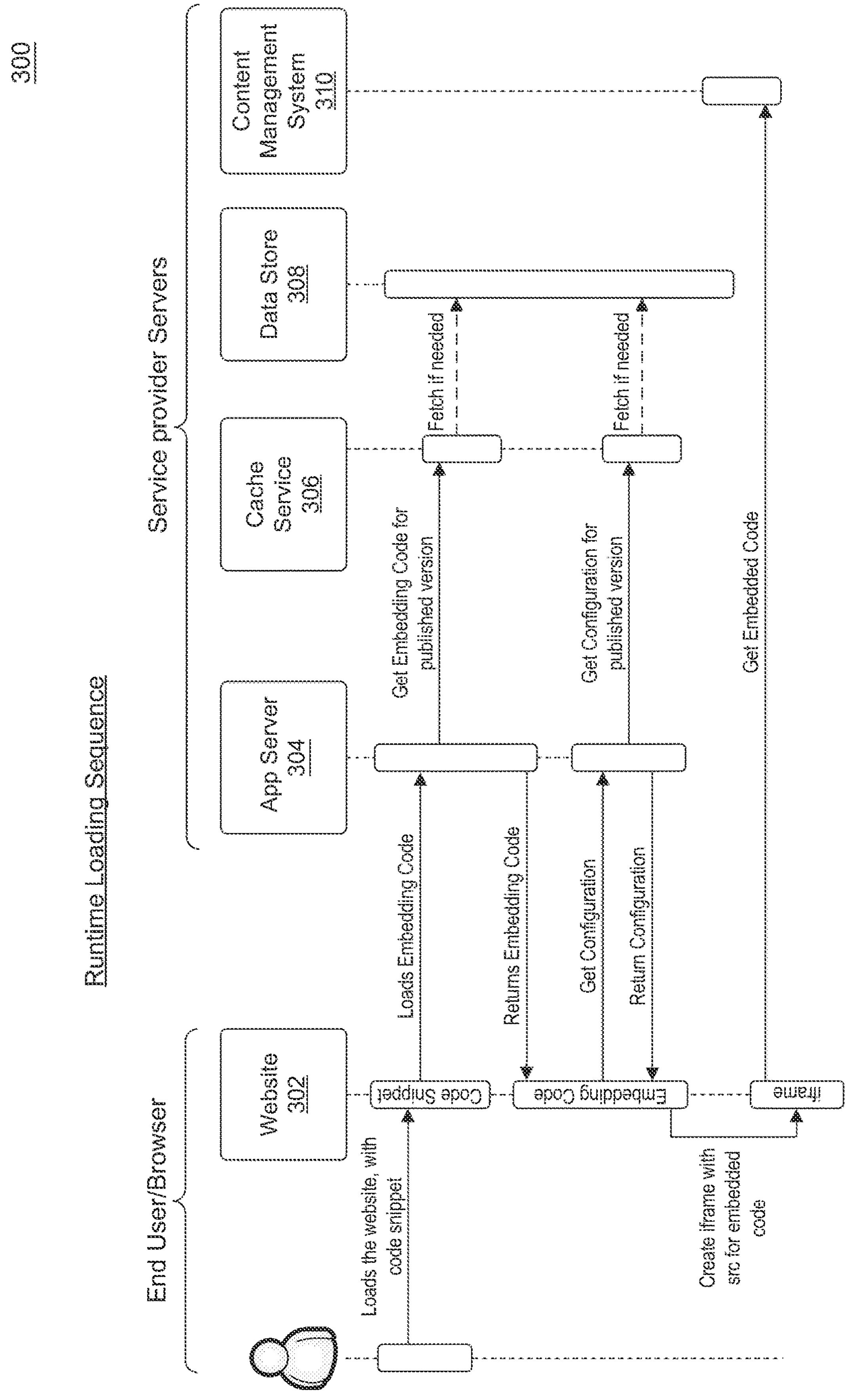

300
Runtime Loading Sequence
End User/Browser
Service provider Servers
Website 302
App Server 304
Cache Service 306
Data Store 308
Content Management System 310
Loads the website, with code snippet
Code Snippet
Loads Embedding Code
Get Embedding Code for published version
Fetch if needed
Returns Embedding Code
Embedding Code
Get Configuration
Get Configuration for published version
Fetch if needed
Return Configuration
Create iframe with src for embedded code
iframe
Get Embedded Code

FIG. 3

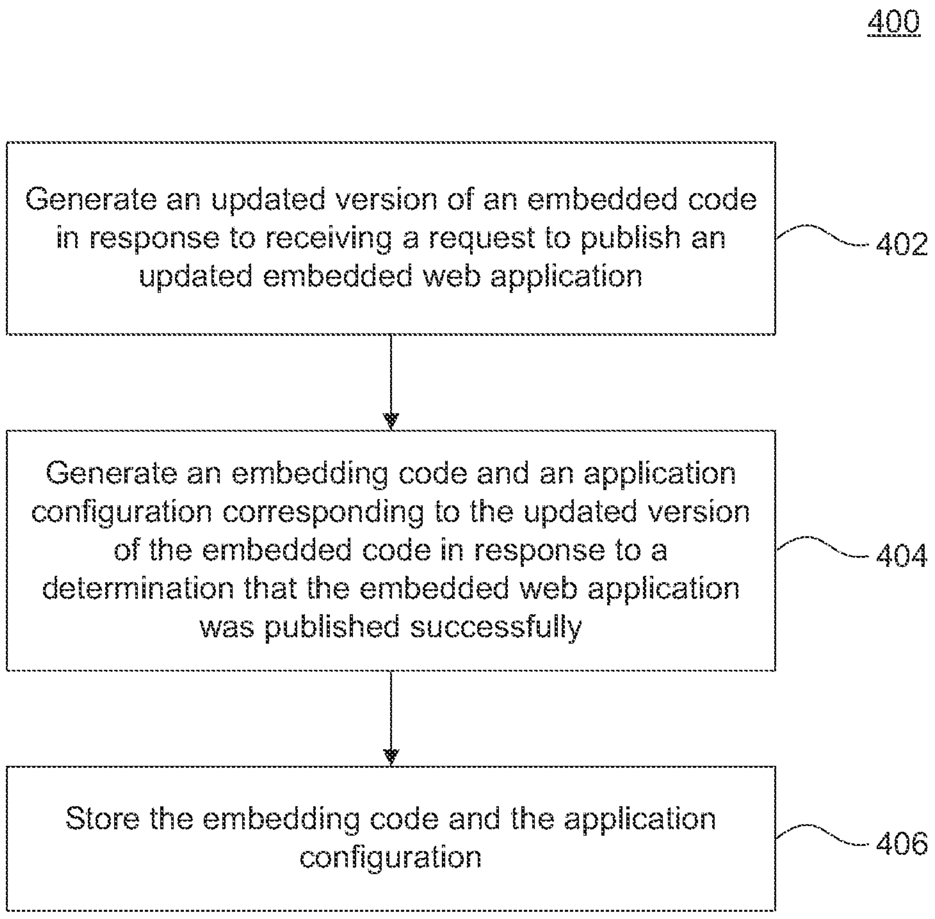

400
Generate an updated version of an embedded code in response to receiving a request to publish an updated embedded web application
402
Generate an embedding code and an application configuration corresponding to the updated version of the embedded code in response to a determination that the embedded web application was published successfully
404
Store the embedding code and the application configuration
406

FIG. 4

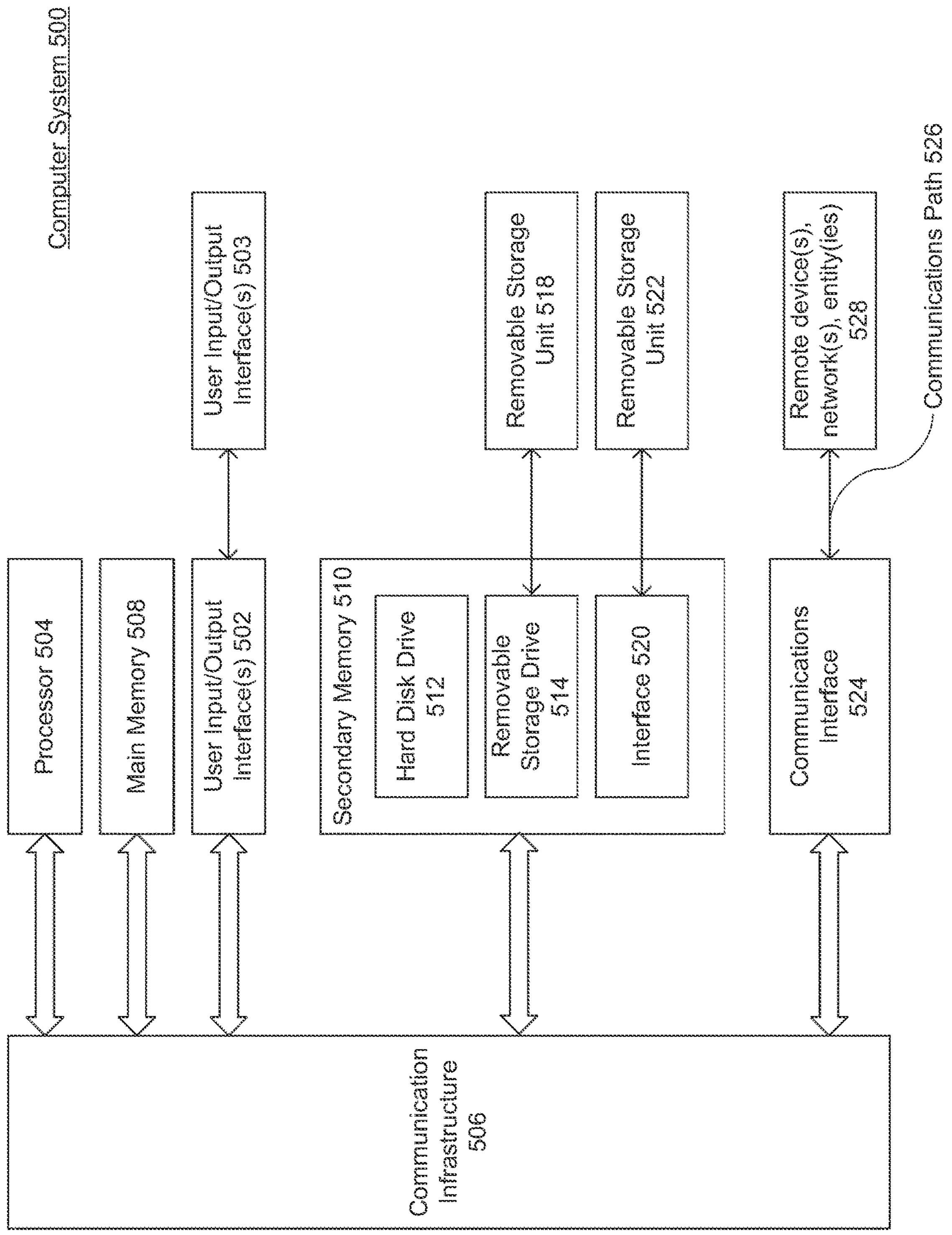

Computer System 500
Processor 504
Main Memory 508
User Input/Output Interface(s) 502
User Input/Output Interface(s) 503
Secondary Memory 510
Hard Disk Drive 512
Removable Storage Drive 514
Interface 520
Removable Storage Unit 518
Removable Storage Unit 522
Communications Interface 524
Remote device(s), network(s), entity(ies) 528
Communications Path 526
Communication Infrastructure 506

FIG. 5

SYSTEM FOR PUBLISHING EMBEDDED WEB APPLICATION WITH ATOMIC VERSION CONTROL

BACKGROUND

[0001] One or more implementations relate to the field of publishing embedded web applications.

[0002] A web application is an application software delivered over the Internet and is run in a web browser. Modern web applications are often complex and require a publishing system to keep the application cohesive as it is updated with new views, components, and configurations. A publishing system for web applications typically has a development phase, where an administrator configures and designs the website. A publishing system further includes a publishing process where various design resources are converted and compiled into resources that are subsequently consumed by runtime processes which serve the resources to users on the Internet.

[0003] An embedded web application is usually enclosed inside an iframe and embedded within a larger parent website. Hence, updating an embedded web application may necessitate changes to the parent webpage and/or changes to the code that enable communication between the embedded application and the parent webpage. A mismatch between versions of various code sets corresponding to the embedded application may result in an inconsistent user experience. Accordingly, what is needed is a system to facilitate a consistent versioned publication of embedded web applications.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] The accompanying drawings are incorporated herein and form a part of the specification.

[0005] FIG. **1** illustrates a block diagram of an exemplary embedded web application, in accordance with some embodiments.

[0006] FIG. **2** illustrates a block diagram of an exemplary method for publishing an embedded web application, in accordance with some embodiments.

[0007] FIG. **3** illustrates a block diagram of an exemplary runtime loading sequence for publishing embedded web applications with atomic version control, in accordance with some embodiments.

[0008] FIG. **4** illustrates an exemplary method for publishing an embedded web application with atomic version control, according to some embodiments.

[0009] FIG. **5** depicts an example computer system useful for implementing various embodiments.

[0010] In the drawings, like reference numbers generally indicate identical or similar elements. Additionally, generally, the left-most digit(s) of a reference number identifies the drawing in which the reference number first appears.

DETAILED DESCRIPTION

[0011] Provided herein are system, apparatus, device, method and/or computer program product embodiments, and/or combinations and sub-combinations thereof, for publishing an embedded web application with atomic version control.

[0012] According to some embodiments, when a web application is updated and published, the publishing system may have a means of grouping the changes into a cohesive set and assigning it a unique version name or a unique version number. According to some aspects, version control with a publishing system prevents mixing newly published files with content from previously published versions of software and ensures a consistent user experience. According to some aspects, a publishing system may publish all of the resources except the initial resource (e.g., home page/index.html) using a path unique to the version being published and subsequently replaces the initial resource with an updated version referencing all of the new resources.

[0013] According to some aspects, an embedded web application is enclosed within a larger parent webpage, and an embedding code enables the communication between the embedded web application and the parent webpage. According to some aspects, the owner of an embedded web application may wish to update the application in such a way as to require changes in the parent webpage, for example, changes to the dimensions of the iframe, changes to the messages exchanged between the parent webpage and the embedded web application, and the like. Furthermore, the administrator of the embedded web application may not be the same as the owner of the parent webpage. Hence, coordinating concurrent updates to the parent webpage and the embedded web application might be difficult.

[0014] According to some aspects, an embedded web application may utilize a set of externally-supplied configurations obtained at runtime. According to some aspects, a real-time application server may be utilized to deliver external embedding code and application configuration that is consistent with the published version of the embedded web application. Maintaining consistency between the published version of the embedded web application and the embedding code and configuration avoids code mismatches that may result in an inconsistent end-user experience.

[0015] Various embodiments of these features will now be discussed with respect to the corresponding figures.

[0016] FIG. **1** illustrates a block diagram of an exemplary embedded web application, in accordance with some embodiments. As illustrated in FIG. **1**, embedded web application **106** is enclosed within a larger parent web page **102** (e.g., a consumer webpage). Exemplary applications that may be embedded in a webpage include embedded advertisements, embedded videos (e.g., YouTube, Vimeo, etc.), discussion threads (e.g., Disqus, Facebook comments), social media posts, and real-time messaging applications (e.g., chat applications and the like).

[0017] According to some aspects, the parent webpage **102** includes an iframe **108**, and the embedded web application **106** is enclosed within the iframe **108**. The parent web page **102** also includes an in-lined code snippet **104**. According to some aspects, embedded application **106** utilizes various sets of code, including an embedding code, an embedding code, and an application configuration. According to some aspects, an external application server is used to deliver the embedding code and application configuration corresponding to the published version of the embedded application to the customer webpage **102**.

[0018] According to some aspects, all the embedding code may be contained in a code snippet. Alternatively, for complex web applications, the embedding code may be included in the code snippet as attributes for the iframe, as a free JavaScript, or as a separate external file. According to some aspects, using the code snippet **110**, application configuration and embedding code are loaded from an external application server located in the Internet **110**. As illustrated in FIG. **1**, code snippet **104** includes instructions to create a request to an application server to fetch application configuration and embedding code corresponding to the published version of the embedded application.

[0019] According to some aspects, the configuration code may specify various attributes of the embedded application, and the embedding code may include instructions that enable communication between the embedded application **106** and the parent page **102**.

[0020] The embedding code is consumed by the parent page **102** and may include a Javascript function to create the iframe **108**. According to some aspects, the embedding code may also include a URL of the embedded code.

[0021] According to some aspects, the embedded code implements the embedded application **106** and is loaded into an iframe **108** inside the parent webpage **102**. According to some aspects, the embedded code is generated by a third-party website or server and is loaded into the iframe **108**. According to some aspects, the code snippet **104** is kept to a minimal size, and the configuration code and the embedding code are loaded externally

[0022] FIG. **2** illustrates a block diagram of an exemplary process for publishing an embedded web application, in accordance with some embodiments. FIG. **2** may be described with reference to elements from FIG. **1**.

[0023] At **202**, a website administrator may click on a publish button to publish an updated embedded web application. According to some aspects, a determination is made at **204** as to whether the deployment is a web deployment or a mobile deployment. According to some aspects, based on a determination that the deployment type is a web deployment, an application programming interface (API) call may be made to a content management system to publish the site. According to some aspects, the publishing process at **206** prepares XML pages and component code to be consumed as content. According to some aspects, an updated component code is generated at **206**, and a URL to makes calls to services is updated.

[0024] At **208**, a determination is made as to whether the publishing process is a success. According to some aspects, if the publish process is a success, the procedure to implement atomic version control is subsequently executed. Alternatively, if the publish process is not a success, at **210**, an error message is displayed at the administrator's user interface. At **212**, based on a determination that the publishing process is a success, a set of resources containing the data needed to create the embedding code are generated. The generated set of resources may be stored in a persistent entity at a data store core server. According to some aspects, embedding code and application configuration corresponding to the published embedded application are generated. The generated embedding code and application configuration, along with corresponding custom labels, may also be stored in a persistent entity at a core server.

[0025] At **214**, an invalid cache event is pushed to a cache server. According to some aspects, the cache service is invalidated so that the embedding code and the configuration corresponding to the latest published version are fetched from the core server.

[0026] FIG. **3** illustrates a block diagram of an exemplary runtime loading sequence for publishing embedded web application with atomic version control, according to some embodiments.

[0027] According to some aspects, the exemplary system comprises an application server **304**, a cache service **306**, a data store **308**, and a content management system **310**. Furthermore, website **302** includes a webpage that may host an embedded web application. According to some aspects, the webpage includes an in-lined code snippet that communicates with an application server **304**.

[0028] According to some aspects, when a user loads the webpage with the code snippet, the in-line code snippet sends a request to the application server **304** to fetch appropriate embedding code corresponding to the embedded web application last published by the user. According to some aspects, the request sent by the code snippet includes an identifier corresponding to the customer and/or an identifier corresponding to the website **302**. The request may also include an identifier corresponding to the embedded application. According to some aspects, the application server **304** performs a look-up to determine the embedding code corresponding to the published version of the embedded web application. The application server may obtain the embedding code corresponding to the published version of the embedded web application from a cache service **306**.

[0029] According to some aspects, a copy of the embedding code and the application configuration corresponding to the published version of the embedded application are stored at a data store **308**. According to some aspects, the data store **308** may be a persistent data storage device. If the embedding code corresponding to the published version of the embedded web application is unavailable at the cache service **306** or if the cache service was indicated to be invalid, the appropriate embedding code is fetched from the data store **308**, and the application server **304** returns the embedding code to the website **302**.

[0030] According to some aspects, once the appropriate embedding code is received at the webpage, the embedding code generates a request to the application server **304** to fetch the appropriate application configuration corresponding to the published embedded web application. The application server **304** may obtain the application configuration corresponding to the published version of the embedded web application from a cache service **306**. Alternatively, if the application configuration corresponding to the published version of the embedded web application is unavailable at the cache service **306** or if the cache service was indicated to be invalid, the appropriate version of the application configuration is fetched from the data store **308**, and the application server **304** returns it to the website **302**.

[0031] According to some aspects, the embedding code creates an iframe that may be used for encapsulating the embedded code corresponding to the embedded application. In addition, the embedding code uses the received application configuration and generates a request to a content management system **310** to fetch the appropriate embedded code. According to some aspects, the content management system **310** returns the embedded code corresponding to the published version of the embedded application. The embedded code is encapsulated within the iframe to implement the embedded application on the webpage.

[0032] FIG. **4** is a flowchart for method **400** for publishing an embedded web application with atomic version control, according to an embodiment. Method **400** can be performed by processing logic that can comprise hardware (e.g., circuitry, dedicated logic, programmable logic, microcode, etc.), software (e.g., instructions executing on a processing device), or a combination thereof. It is to be appreciated that not all steps may be needed to perform the disclosure provided herein. Further, some of the steps may be performed simultaneously, or in a different order than shown in FIG. **4**, as will be understood by a person of ordinary skill in the art.

[0033] Method **400** shall be described with reference to FIGS. **1-3**. However, method **400** is not limited to those example embodiments.

[0034] At **402**, an updated version of an embedded code is generated in response to receiving a request to publish an updated embedded web application. According to some aspects, the embedded code includes instructions for implementing the updated embedded web application at a web client. According to some aspects, the embedded web application is a multi-tenant embedded web application. According to some aspects, the embedded code is generated by a content management system. According to some aspects, the embedded web application is a real-time messaging application.

[0035] At **404**, an embedding code and an application configuration corresponding to the updated version of the embedded code are generated in response to a determination that the embedded web application was published successfully. According to some aspects, the embedding code includes instructions for creating an iframe for embedding the web application within a parent page at a web client. According to some aspects, the application configuration includes a plurality of attributes of an iframe for embedding the web application within a parent page at a web client. According to some aspects, the application configuration includes information corresponding to the dimensions of the iframe, color attributes, layout of the text boxes, and the input fields corresponding to the embedded application. According to some aspects, the application configuration is generated in the format of a Javascript object notation (JSON) object.

[0036] At **406**, the embedding code and the application configuration are stored on a data store server. According to some aspects, the data store server includes a persistent storage device that stores the embedding code and the application configuration. According to some aspects, an end-user website may send a request to an application server **304** to fetch embedding code corresponding to the user's published version of the embedded web application. According to some aspects, the application server may perform a look-up to determine the appropriate embedding code corresponding to the published version of the embedded web application. The application server may obtain the embedding code corresponding to the user's published version of the embedded web application.

[0037] According to some aspects, an application server sends the embedding code and the application configuration to a web client in response to receiving a request generated by an in-line code snippet at the web client. According to some aspects, once the embedding code and the application configuration are stored in a persistent storage device, the application server cache containing an embedding code and an application configuration corresponding to a previous version of the embedded code is invalidated.

[0038] Various embodiments may be implemented, for example, using one or more well-known computer systems, such as computer system **500** shown in FIG. **5**. One or more computer systems **500** may be used, for example, to implement any of the embodiments discussed herein, as well as combinations and sub-combinations thereof.

[0039] Computer system **500** may include one or more processors (also called central processing units, or CPUs), such as a processor **504**. Processor **504** may be connected to a communication infrastructure or bus **506**.

[0040] Computer system **500** may also include user input/output device(s) **503**, such as monitors, keyboards, pointing devices, etc., which may communicate with communication infrastructure **506** through user input/output interface(s) **502**.

[0041] One or more of processors **504** may be a graphics processing unit (GPU). In an embodiment, a GPU may be a processor that is a specialized electronic circuit designed to process mathematically intensive applications. The GPU may have a parallel structure that is efficient for parallel processing of large blocks of data, such as mathematically intensive data common to computer graphics applications, images, videos, etc.

[0042] Computer system **500** may also include a main or primary memory **508**, such as random access memory (RAM). Main memory **508** may include one or more levels of cache. Main memory **508** may have stored therein control logic (i.e., computer software) and/or data.

[0043] Computer system **500** may also include one or more secondary storage devices or memory **510**. Secondary memory **510** may include, for example, a hard disk drive **512** and/or a removable storage device or drive **514**. Removable storage drive **514** may be a floppy disk drive, a magnetic tape drive, a compact disk drive, an optical storage device, tape backup device, and/or any other storage device/drive.

[0044] Removable storage drive **514** may interact with a removable storage unit **518**. Removable storage unit **518** may include a computer usable or readable storage device having stored thereon computer software (control logic) and/or data. Removable storage unit **518** may be a floppy disk, magnetic tape, compact disk, DVD, optical storage disk, and/any other computer data storage device. Removable storage drive **514** may read from and/or write to removable storage unit **518**.

[0045] Secondary memory **510** may include other means, devices, components, instrumentalities or other approaches for allowing computer programs and/or other instructions and/or data to be accessed by computer system **500**. Such means, devices, components, instrumentalities or other approaches may include, for example, a removable storage unit **522** and an interface **520**. Examples of the removable storage unit **522** and the interface **520** may include a program cartridge and cartridge interface (such as that found in video game devices), a removable memory chip (such as an EPROM or PROM) and associated socket, a memory stick and USB port, a memory card and associated memory card slot, and/or any other removable storage unit and associated interface.

[0046] Computer system **500** may further include a communication or network interface **524**. Communication interface **524** may enable computer system **500** to communicate and interact with any combination of external devices, external networks, external entities, etc. (individually and collectively referenced by reference number **528**). For example, communication interface **524** may allow computer system **500** to communicate with external or remote devices **528** over communications path **526**, which may be wired and/or wireless (or a combination thereof), and which may include any combination of LANs, WANs, the Internet, etc. Control logic and/or data may be transmitted to and from computer system **500** via communication path **526**.

[0047] Computer system **500** may also be any of a personal digital assistant (PDA), desktop workstation, laptop or notebook computer, netbook, tablet, smart phone, smart watch or other wearable, appliance, part of the Internet-of-Things, and/or embedded system, to name a few non-limiting examples, or any combination thereof.

[0048] Computer system **500** may be a client or server, accessing or hosting any applications and/or data through any delivery paradigm, including but not limited to remote or distributed cloud computing solutions; local or on-premises software ("on-premise" cloud-based solutions); "as a service" models (e.g., content as a service (CaaS), digital content as a service (DCaaS), software as a service (SaaS), managed software as a service (MSaaS), platform as a service (PaaS), desktop as a service (DaaS), framework as a service (FaaS), backend as a service (BaaS), mobile backend as a service (MBaaS), infrastructure as a service (IaaS), etc.); and/or a hybrid model including any combination of the foregoing examples or other services or delivery paradigms.

[0049] Any applicable data structures, file formats, and schemas in computer system **500** may be derived from standards including but not limited to JavaScript Object Notation (JSON), Extensible Markup Language (XML), Yet Another Markup Language (YAML), Extensible Hypertext Markup Language (XHTML), Wireless Markup Language (WML), MessagePack, XML User Interface Language (XUL), or any other functionally similar representations alone or in combination. Alternatively, proprietary data structures, formats or schemas may be used, either exclusively or in combination with known or open standards.

[0050] In some embodiments, a tangible, non-transitory apparatus or article of manufacture comprising a tangible, non-transitory computer uscable or readable medium having control logic (software) stored thereon may also be referred to herein as a computer program product or program storage device. This includes, but is not limited to, computer system **500**, main memory **508**, secondary memory **510**, and removable storage units **518** and **522**, as well as tangible articles of manufacture embodying any combination of the foregoing. Such control logic, when executed by one or more data processing devices (such as computer system **500**), may cause such data processing devices to operate as described herein.

[0051] Based on the teachings contained in this disclosure, it will be apparent to persons skilled in the relevant art(s) how to make and use embodiments of this disclosure using data processing devices, computer systems and/or computer architectures other than that shown in FIG. **5**. In particular, embodiments can operate with software, hardware, and/or operating system implementations other than those described herein.

[0052] It is to be appreciated that the Detailed Description section, and not any other section, is intended to be used to interpret the claims. Other sections can set forth one or more but not all exemplary embodiments as contemplated by the inventor(s), and thus, are not intended to limit this disclosure or the appended claims in any way.

[0053] While this disclosure describes exemplary embodiments for exemplary fields and applications, it should be understood that the disclosure is not limited thereto. Other embodiments and modifications thereto are possible, and are within the scope and spirit of this disclosure. For example, and without limiting the generality of this paragraph, embodiments are not limited to the software, hardware, firmware, and/or entities illustrated in the figures and/or described herein. Further, embodiments (whether or not explicitly described herein) have significant utility to fields and applications beyond the examples described herein.

[0054] Embodiments have been described herein with the aid of functional building blocks illustrating the implementation of specified functions and relationships thereof. The boundaries of these functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternate boundaries can be defined as long as the specified functions and relationships (or equivalents thereof) are appropriately performed. Also, alternative embodiments can perform functional blocks, steps, operations, methods, etc. using orderings different than those described herein.

[0055] References herein to "one embodiment," "an embodiment," "an example embodiment," or similar phrases, indicate that the embodiment described can include a particular feature, structure, or characteristic, but every embodiment can not necessarily include the particular feature, structure, or characteristic. Moreover, such phrases are not necessarily referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with an embodiment, it would be within the knowledge of persons skilled in the relevant art(s) to incorporate such feature, structure, or characteristic into other embodiments whether or not explicitly mentioned or described herein. Additionally, some embodiments can be described using the expression "coupled" and "connected" along with their derivatives. These terms are not necessarily intended as synonyms for each other. For example, some embodiments can be described using the terms "connected" and/or "coupled" to indicate that two or more elements are in direct physical or electrical contact with each other. The term "coupled," however, can also mean that two or more elements are not in direct contact with each other, but yet still co-operate or interact with each other.

[0056] The breadth and scope of this disclosure should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A computer-implemented method, comprising:

generating an updated version of an embedded code in response to receiving a request to publish an updated embedded web application;

generating an embedding code and an application configuration corresponding to the updated version of the embedded code in response to a determination that the embedded web application was published successfully; and

storing the embedding code and the application configuration.

2. The method of claim **1**, further comprising:

sending the embedding code and the application configuration to a web client in response to receiving a request generated by an in-line code snippet at the web client.

3. The method of claim **1**, further comprising:

invalidating an application server cache containing an embedding code and an application configuration corresponding to a previous version of the embedded code.

4. The method of claim **1**, wherein the embedding code includes instructions for creating an iframe for embedding the web application within a parent page at a web client.

5. The method of claim **1**, wherein application configuration includes a plurality of attributes of an iframe for embedding the web application within a parent page at a web client.

6. The method of claim **1**, wherein the embedded code includes instructions for implementing the updated embedded web application at a web client.

7. The method of claim **1**, wherein the embedded web application is a real-time messaging application.

8. A system, comprising:

a memory; and

at least one processor coupled to the memory and configured to:

generate an updated version of an embedded code in response to receiving a request to publish an updated embedded web application;

generate an embedding code and an application configuration corresponding to the updated version of the embedded code in response to a determination that the embedded web application was published successfully; and

store the embedding code and the application configuration.

9. The method of claim **8**, wherein the at least one processor is further configured to:

send the embedding code and the application configuration to a web client in response to receiving a request generated by an in-line code snippet at the web client.

10. The system of claim **8**, wherein the at least one processor is further configured to:

invalidate an application server cache containing an embedding code and an application configuration corresponding to a previous version of the embedded code.

11. The system of claim **8**, wherein the embedding code includes instructions for creating an iframe for embedding the web application within a parent page at a web client.

12. The system of claim **8**, wherein application configuration includes a plurality of attributes of an iframe for embedding the web application within a parent page at a web client.

13. The system of claim **8**, wherein the embedded code includes instructions for implementing the updated embedded web application at a web client.

14. The system of claim **8**, wherein the embedded web application is a real-time messaging application.

15. A non-transitory computer-readable medium (CRM) having instructions stored thereon that, when executed by at least one computing device, causes the at least one computing device to perform operations comprising:

generating an updated version of an embedded code in response to receiving a request to publish an updated embedded web application;

generating an embedding code and an application configuration corresponding to the updated version of the embedded code in response to a determination that the embedded web application was published successfully; and

storing the embedding code and the application configuration.

16. The non-transitory CRM of claim **15**, further comprises:

sending the application configuration and the embedding code to a web client in response to receiving a request generated by an in-line code snippet at the web client.

17. The non-transitory CRM of claim **15**, further comprises:

invalidating an application server cache containing an application configuration and an embedded code corresponding to a previous version of the embedded code

18. The non-transitory CRM of claim **15**, wherein the embedding code includes instructions for creating an iframe for embedding the web application within a parent page at a web client.

19. The non-transitory CRM of claim **15**, wherein application configuration includes a plurality of attributes of an iframe for embedding the web application within a parent page at a web client.

20. The non-transitory CRM of claim **15**, wherein the embedded code includes instructions for implementing the updated embedded web application at a web client.

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