

METHOD, APPARATUS, AND DEVICE FOR PROCESSING WEB APPLICATION PACKAGE

TECHNICAL FIELD

[0001] The present specification relates to the field of computer technologies, and
5 in particular, to a method, an apparatus, and a device for processing a web application
package.

BACKGROUND

[0002] With development of network technologies, ever-increasing web pages are
used for web applications.

10 [0003] A service person usually integrates resource files involved in running of
the web application, and provides the resource files for a web container in a form of a
compressed application package, and the web container loads the compressed
application package for user access. The compressed application package includes
resources, such as a jar package, a class file, a css file, and a picture, needed for
15 running the application.

[0004] Based on this, a more space-saving web application package generation
method is needed.

SUMMARY

[0005] Implementations of the present specification provide a method, an
20 apparatus, and a device for processing a web application package, to provide a more
space-saving web application package generation method.

[0006] Based on this, an implementation of the present specification provides a
method for processing a web application package. The method includes: determining
a resource required by a web application; storing the resource, and determining a
25 resource address corresponding to the resource; and generating a web application
package that includes the resource address, where the web application package does

not include the resource corresponding to the resource address.

[0007] In addition, an implementation of the present specification further provides a method for processing a web application package. The method includes: determining a resource address included in a web application package, where the
5 resource address is determined before the application package is generated; obtaining a corresponding resource based on the resource address; and loading the web application package based on the resource.

[0008] In addition, an implementation of the present specification further provides an apparatus for processing a web application package. The apparatus includes: a
10 determining module, configured to determine a resource required by a web application; a storage module, configured to store the resource, and determine a resource address corresponding to the resource; and a generation module, configured to generate a web application package that includes the resource address, where the web application package does not include the resource corresponding to the resource
15 address.

[0009] In addition, an implementation of the present specification further provides an apparatus for processing a web application package. The apparatus includes: a determining module, configured to determine a resource address included in a web application package, where the resource address is determined before the application
20 package is generated; an acquisition module, configured to obtain a corresponding resource based on the resource address; and a loading module, configured to load the web application package based on the resource.

[0010] An implementation of the present specification further provides a device for processing a web application package. The device includes: a memory, configured to store a web application package generation program; and a processor, configured to
25 invoke the web application package generation program in the memory, and perform the following operations after receiving a web application package generation request: determining a resource required by a web application; storing the resource, and determining a resource address corresponding to the resource; and generating a web application package that includes the resource address, where the web application
30 package does not include the resource corresponding to the resource address.

[0011] An implementation of the present specification further provides a device for processing a web application package. The device includes: a memory, configured to store a web application package loading program; and a processor, configured to

invoke the web application package loading program in the memory, and perform the following operations after receiving a web application package loading request: determining a resource address included in a web application package, where the resource address is determined before the application package is generated; obtaining
 5 a corresponding resource based on the resource address; and loading the web application package based on the resource.

[0012] Correspondingly, an implementation of the present specification further provides a nonvolatile computer storage medium. The storage medium stores a computer executable instruction, and the computer executable instruction is used to
 10 perform the following operations: monitoring a web application package generation request; determining a resource required by a web application; storing the resource, and determining a resource address corresponding to the resource; and generating a web application package that includes the resource address, where the web application package does not include the resource corresponding to the resource address.

[0013] Correspondingly, an implementation of the present specification further provides a nonvolatile computer storage medium. The storage medium stores a computer executable instruction, and the computer executable instruction is used to perform the following operations: monitoring a web application package loading
 15 request; determining a resource address included in a web application package, where the resource address is determined before the application package is generated; obtaining a corresponding resource based on the resource address; and loading the web application package based on the resource.

[0014] The previous at least one technical solution used in the implementations of the present specification can achieve the following beneficial effects:

[0015] Various resources required by a specific web application are determined, some of the resources are uploaded to a storage device, a generated application package does not include the stored some of the resources, and the web application package includes resource addresses of the some of the resources in the storage
 25 device.

[0016] In the implementations of the present specification, a resource is uploaded to the storage device, and a generated web application compression package does not include the stored resource, and includes a corresponding resource address, so that the corresponding resource is obtained by using the address when the package is loaded. As such, the web application package is reduced by a large quantity of static resources,

thereby reducing space occupied by the web application package.

BRIEF DESCRIPTION OF DRAWINGS

[0017] FIG. 1 is a schematic diagram illustrating an architecture, according to an implementation of the present specification;

5 [0018] FIG. 2 is a schematic flowchart illustrating a method, according to an implementation of the present specification;

[0019] FIG. 3 is a schematic flowchart illustrating a part of a method, according to an implementation of the present specification;

10 [0020] FIG. 4 is a schematic flowchart illustrating a method, according to an implementation of the present specification;

[0021] FIG. 5 is a schematic structural diagram of an apparatus, according to an implementation of the present specification; and

[0022] FIG. 6 is a schematic structural diagram of another apparatus, according to an implementation of the present specification.

DESCRIPTION OF IMPLEMENTATIONS

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[0023] To make the objective, technical solutions, and advantages of the present application clearer, the following clearly and comprehensively describes the technical solutions of the present application with reference to specific implementations and the corresponding accompanying drawings of the present application. Apparently, the described implementations are merely some but not all of the implementations of the present application. All other implementations obtained by a person of ordinary skill in the art based on the implementations of the present application without creative efforts shall fall within the protection scope of the present application.

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[0024] Based on the previous content, web application package processing can include generating a web application package and loading the generated web application package. A web application can include an application program accessed by using a web, and is a set of resources used on a web page to complete a certain task. A jar package is a compressed package obtained by packaging some classes that have been written in the java language. A page rendering control file can include a Hypertext Markup Language (HTML) file, a JavaScript (JS) file, a Cascading Style

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Sheets (CSS) file, etc. A view resource can include a sound file, a picture, a video, etc. that are used to display a page.

[0025] In the implementations of the present specification, an architecture shown in FIG. 1 can be used for a web application package processing method. In the architecture, a web server provides various pages for user browsing; a storage device can be in a plurality of forms such as a hard disk and a database, and is configured to store some static resources required by a web application; and a processing platform can include various clustered or distributed processing devices. In practice, the processing device can include various CPUs, servers, etc. The processing platform can provide a user with other related service functions, for example, provide a one-stop service such as web application development, packaging, and deployment. The storage device and the processing device each can have a respective distributed, clustered, or blockchain structure.

[0026] A data processing process provided in an implementation of the present specification is described below in detail based on the architecture shown in FIG. 1. As shown in FIG. 2, a web application package generation process includes the following steps.

[0027] Step S201: Determine a resource required by a web application.

[0028] Based on the previous content, the web application can include resources such as a plurality of servlets, JSP pages, HTML files, page rendering control files, view files, jar packages, permission control files, and process control files. The resources are developed based on a specific web application demand.

[0029] Specifically, resources such as the jar package, the page rendering control file, and/or the view file that are needed by the web application can be determined.

[0030] Step S203: Store the resource, and determine a resource address corresponding to the resource.

[0031] After the resource required by the web application is determined, a static resource such as the page rendering control file and/or the view file is uploaded to a storage device, a storage address of each resource in the storage device (for example, a URL address of the resource in the storage device) is obtained and recorded, and the storage address is determined as the resource address.

[0032] Step S205: Generate a web application package that includes the resource address, where the web application package does not include the resource corresponding to the resource address.

[0033] Specifically, the present step includes two aspects:

[0034] In one aspect, the generated web application package should include the address of the stored resource. This can be implemented in the following way: A resource reference file that includes the resource address is generated, and the web application package that includes the resource reference file is generated. To be specific, the obtained resource address is written to the resource reference file, and the resource reference file is packaged in the web application package, so that the corresponding resource is obtained based on the resource address when the application package is loaded.

[0035] In another aspect, the generated web application package does not include the resource corresponding to the resource address. To be specific, the resource that is uploaded to the storage device and whose address is recorded is not packaged. The uploaded resource can be manually excluded, or can be excluded in the following way:

[0036] A specified resource is packaged according to a predefined rule, and the web application package that includes the resource address is generated. The specified resource includes a resource with resource address information, and further includes a resource, other than the stored resource, needed when the web application runs.

[0037] In other words, the generated web application package includes the address corresponding to the stored resource, and does not include the stored resource. The two aspects are not executed in a specific order.

[0038] For example, resources, such as the jar package, the page rendering control file, and/or the view file, required by the web application are determined, the page rendering control file and/or the view file are/is uploaded to the storage device, and the corresponding resource address is recorded by using the resource reference file. In a predefined packaging rule, the specified resource includes the resource reference file, the jar package, and another resource needed by the web application, and does not include the page rendering control file and/or the view file, to implement the previous technical solution.

[0039] In the present implementation of the present specification, a resource is uploaded to the storage device, and a generated web application compression package does not include the stored resource, and includes a corresponding resource address, so that the corresponding resource is obtained by using the address when the package is loaded. As such, the web application package is reduced by a large quantity of static

resources, thereby reducing space occupied by the web application package.

[0040] It is worthwhile to note that when an application is developed by using java, source code needs to be compiled into a class file for a computer to identify, only the class file is packaged, and the source code needs to be manually excluded.

5 When a web application is developed by using a specific language (for example, a JS language), because the computer can directly identify a JS file, no compilation is needed, and no class file is generated during development. If the previous predefined packaging mode is used in this case, it can be further specified that a source code file (namely, the JS file) generated during development and another specified resource are
10 uploaded to the storage device, and storage addresses of the source code file and the another specified resource are recorded. In this case, a generated web application package does not include the source code file.

[0041] In other words, if coding is performed by using JS, a web application package is generated by using the previous predefined packaging mode, and no class
15 file is generated before packaging. As such, the generated package occupies less space. During packaging, it is more convenient because the source code file does not need to be manually excluded.

[0042] In another implementation of the present specification, after the jar package required by the web application is determined, as shown in FIG. 3, the web
20 application package generation method further includes the following steps:

[0043] Step S301: Determine class information in the jar package.

[0044] Step S303: Generate a configuration file of the class information.

[0045] Step S305: Generate the web application package that includes the configuration file.

25 **[0046]** In other words, the configuration file of the class information explicitly records the class information involved in the web application package. The generated web application package includes the configuration file, so that when the application package is loaded on a platform, the platform can establish a dedicated class loader for the application package based on the configuration file, to avoid a conflict caused
30 when a plurality of web application packages are loaded.

[0047] After the web application package is generated, the web application package is deployed on a web server, and in this case, the web server needs to load the web application package. In another implementation of the present specification, a web application package processing method is provided. As shown in FIG. 4, the

method includes the following steps:

[0048] Step S401: Determine a resource address included in a web application package, where the resource address is determined before the application package is generated.

5 **[0049]** Step S403: Obtain a corresponding resource based on the resource address.

[0050] Step S405: Load the web application package based on the resource.

[0051] To be specific, in the loading process, a web server dynamically obtains the corresponding resource (for example, obtains a stored page rendering control file and a stored view file) based on the resource address in the web application package,
10 and performs page rendering.

[0052] In another implementation of the present specification, the previous step S405 of loading the web application package based on the resource includes: determining a configuration file of class information in the web application package, where the configuration file of the class information includes class information in a
15 jar package in the web application package, and is determined before the application package is generated; establishing a class loader based on the configuration file of the class information; and loading the web application package based on the resource by using the class loader.

[0053] To be specific, when loading the application package, the web server can
20 establish a dedicated class loader based on the configuration file, to avoid a conflict caused when a plurality of web application packages are loaded.

[0054] Based on the same concept, an implementation of the present specification further provides a web application package processing apparatus. As shown in FIG. 5, the apparatus includes: a determining module 501, configured to determine a resource
25 required by a web application; a storage module 503, configured to store the resource, and determine a resource address corresponding to the resource; and a generation module 505, configured to generate a web application package that includes the resource address, where the web application package does not include the resource corresponding to the resource address.

30 **[0055]** Further, the determining module 501 is configured to determine a jar package, a page rendering control file, and/or a view resource that are required by the web application.

[0056] Further, the generation module 505 is configured to determine class information in the jar package, generate a configuration file of the class information,

and generate the web application package that includes the configuration file.

[0057] Further, the storage module 503 is configured to store the page rendering control file and/or the view resource, obtain a storage address of the page rendering control file and/or a storage address of the view resource, and determine the storage address as the resource address.

[0058] Further, the generation module 505 is configured to package a specified resource according to a predefined rule, and generate the web application package that includes the resource address.

[0059] Further, the generation module 505 is configured to generate a resource reference file that includes the resource address, and generate the web application package that includes the resource reference file.

[0060] An implementation of the present specification further provides a web application package processing apparatus. The apparatus includes: a determining module 601, configured to determine a resource address included in a web application package, where the resource address is determined before the application package is generated; an acquisition module 603, configured to obtain a corresponding resource based on the resource address; and a loading module 605, configured to load the web application package based on the resource.

[0061] Further, the acquisition module 603 is configured to obtain, based on the resource address, a page rendering control file and/or a view resource corresponding to the resource address.

[0062] Further, the loading module 605 is configured to determine a configuration file of class information in the web application package, where the configuration file of the class information includes class information in a jar package in the web application package, and is determined before the application package is generated; establish a class loader based on the configuration file of the class information; and load the web application package by using the class loader.

[0063] Correspondingly, the present specification further provides a web application package processing device. The device includes: a memory, configured to store a web application package generation program; and a processor, configured to invoke the web application package generation program in the memory, and perform the following operations after receiving a web application package generation request: determining a resource required by a web application; storing the resource, and determining a resource address corresponding to the resource; and generating a web

application package that includes the resource address, where the web application package does not include the resource corresponding to the resource address.

[0064] Correspondingly, the present specification further provides another web application package processing device. The device includes: a memory, configured to
5 store a web application package loading program; and a processor, configured to invoke the web application package loading program in the memory, and perform the following operations after receiving a web application package loading request: determining a resource address included in a web application package, where the resource address is determined before the application package is generated; obtaining
10 a corresponding resource based on the resource address; and loading the web application package based on the resource.

[0065] Based on the same inventive concept, an implementation of the present application further provides a corresponding nonvolatile computer storage medium. The storage medium stores a computer executable instruction, and the computer
15 executable instruction is used to perform the following operations: monitoring a web application package generation request; determining a resource required by a web application; storing the resource, and determining a resource address corresponding to the resource; and generating a web application package that includes the resource address, where the web application package does not include the resource
20 corresponding to the resource address.

[0066] Correspondingly, an implementation of the present specification further provides another nonvolatile computer storage medium. The storage medium stores a computer executable instruction, and the computer executable instruction is used to perform the following operations: monitoring a web application package loading
25 request; determining a resource address included in a web application package, where the resource address is determined before the application package is generated; obtaining a corresponding resource based on the resource address; and loading the web application package based on the resource.

[0067] The implementations of the present specification are described in a
30 progressive way. For same or similar parts of the implementations, mutual references can be made to the implementations. Each implementation focuses on a difference from the other implementations. Particularly, the apparatus implementation, the device implementation, and the medium implementation are basically similar to the method implementation, and therefore are described briefly. For related parts,

references can be made to related description in the method implementation. Details are omitted here for simplicity.

[0068] Specific implementations of the present specification are described above. Other implementations fall within the scope of the appended claims. In some situations, the actions or steps described in the claims can be performed in a sequence different from the sequence in the implementation and the desired results can still be achieved. In addition, the process depicted in the accompanying drawings does not necessarily require a particular execution sequence to achieve the desired results. In some implementations, multi-tasking and parallel processing can be advantageous.

[0069] In the 1990s, whether a technical improvement is a hardware improvement (for example, an improvement to a circuit structure such as a diode, a transistor, or a switch) or a software improvement (an improvement to a method procedure) can be clearly distinguished. However, as technologies develop, current improvements to many method procedures can be considered as direct improvements to hardware circuit structures. A designer usually programs an improved method procedure into a hardware circuit, to obtain a corresponding hardware circuit structure. Therefore, a method procedure can be improved by using a hardware entity module. For example, a programmable logic device (PLD) (for example, a field programmable gate array (FPGA)) is such an integrated circuit, and a logical function of the PLD is determined by a user through device programming. The designer performs programming to "integrate" a digital system to a PLD without requesting a chip manufacturer to design and produce an application-specific integrated circuit chip. In addition, at present, instead of manually manufacturing an integrated chip, this type of programming is mostly implemented by using "logic compiler" software. The programming is similar to a software compiler used to develop and write a program. Original code needs to be written in a particular programming language for compilation. The language is referred to as a hardware description language (HDL). There are many HDLs such as the Advanced Boolean Expression Language (ABEL), the Altera Hardware Description Language (AHDL), Confluence, the Cornell University Programming Language (CUPL), HDCal, the Java Hardware Description Language (JHDL), Lava, Lola, MyHDL, PALASM, and the Ruby Hardware Description Language (RHDL). The very-high-speed integrated circuit hardware description language (VHDL) and Verilog are most commonly used. A person skilled in the art should also understand that a hardware circuit that implements a logical method procedure can be readily

obtained once the method procedure is logically programmed by using the several described hardware description languages and is programmed into an integrated circuit.

[0070] A controller can be implemented by using any appropriate method. For example, the controller can be a microprocessor or a processor, or a computer-readable medium that stores computer readable program code (such as software or firmware) that can be executed by the microprocessor or the processor, a logic gate, a switch, an application-specific integrated circuit (ASIC), a programmable logic controller, or a built-in microprocessor. Examples of the controller include but are not limited to the following microprocessors: ARC 625D, Atmel AT91SAM, Microchip PIC18F26K20, and Silicone Labs C8051F320. The memory controller can also be implemented as a part of control logic of a memory. A person skilled in the art also knows that, in addition to implementing the controller by using the computer readable program code, logic programming can be performed on method steps to allow the controller to implement the same function in forms of the logic gate, the switch, the application-specific integrated circuit, the programmable logic controller, and the built-in microcontroller. Therefore, the controller can be considered as a hardware component, and an apparatus configured to implement various functions in the controller can also be considered as a structure in the hardware component; or the apparatus configured to implement various functions can even be considered as both a software module implementing the method and a structure in the hardware component.

[0071] The system, apparatus, module, or unit illustrated in the previous implementations can be implemented by using a computer chip or an entity, or can be implemented by using a product having a certain function. A typical implementation device is a computer. The computer can be, for example, a personal computer, a laptop computer, a cellular phone, a camera phone, a smartphone, a personal digital assistant, a media player, a navigation device, an email device, a game console, a tablet computer, a wearable device, or a combination of any of these devices.

[0072] For ease of description, the previous apparatus is described by dividing functions into various units. Certainly, when the implementations of the present specification are implemented, functions of each unit can be implemented in one or more pieces of software and/or hardware.

[0073] A person skilled in the art should understand that an implementation of the

present disclosure can be provided as a method, a system, or a computer program product. Therefore, the present disclosure can use a form of hardware only implementations, software only implementations, or implementations with a combination of software and hardware. In addition, the present disclosure can use a form of a computer program product that is implemented on one or more computer-usable storage media (including but not limited to a disk memory, a CD-ROM, an optical memory, etc.) that include computer-usable program code.

[0074] The present disclosure is described with reference to the flowcharts and/or block diagrams of the method, the device (system), and the computer program product based on the implementations of the present disclosure. It is worthwhile to note that computer program instructions can be used to implement each process and/or each block in the flowcharts and/or the block diagrams and a combination of a process and/or a block in the flowcharts and/or the block diagrams. These computer program instructions can be provided for a general-purpose computer, a dedicated computer, an embedded processor, or a processor of another programmable data processing device to generate a machine, so that the instructions executed by the computer or the processor of the another programmable data processing device generate a device for implementing a specific function in one or more processes in the flowcharts and/or in one or more blocks in the block diagrams.

[0075] These computer program instructions can be stored in a computer readable memory that can instruct a computer or another programmable data processing device to work in a specific way, so that the instructions stored in the computer readable memory generate an artifact that includes an instruction apparatus. The instruction apparatus implements a specific function in one or more processes in the flowcharts and/or in one or more blocks in the block diagrams.

[0076] These computer program instructions can be loaded onto a computer or another programmable data processing device, so that a series of operations and steps are performed on the computer or the another programmable device, thereby generating computer-implemented processing. Therefore, the instructions executed on the computer or other programmable devices provide steps for implementing a specific function in one or more processes in the flowcharts and/or in one or more blocks in the block diagrams.

[0077] In a typical configuration, a computing device includes one or more processors (CPU), input/output interfaces, network interfaces, and memories.

[0078] The memory can include a non-persistent memory, a random access memory (RAM), and/or a nonvolatile memory in a computer readable medium, for example, a read-only memory (ROM) or a flash memory (flash RAM). The memory is an example of the computer readable medium.

5 **[0079]** The computer readable medium includes persistent, non-persistent, movable, and unmovable media that can store information by using any method or technology. The information can be a computer readable instruction, a data structure, a program module, or other data. Examples of a computer storage medium include but are not limited to a parameter random access memory (PRAM), a static random
10 access memory (SRAM), a dynamic random access memory (DRAM), another type of random access memory (RAM), a read-only memory (ROM), an electrically erasable programmable read-only memory (EEPROM), a flash memory or another memory technology, a compact disc read-only memory (CD-ROM), a digital versatile disc (DVD) or other optical storage, a magnetic cassette, a magnetic tape, a magnetic
15 disk storage or another magnetic storage device, or any other non-transmission medium that can be used to store information accessible to the computing device. Based on the definition in the present specification, the computer readable medium does not include transitory computer readable media (transitory media) such as a modulated data signal and carrier.

20 **[0080]** It is worthwhile to further note that the terms "include", "comprise", or their any other variants are intended to cover a nonexclusive inclusion, so that a process, a method, a product, or a device that includes a list of elements not only includes those elements but also includes other elements which are not expressly listed, or further includes elements inherent to such process, method, product, or
25 device. An element preceded by "includes a..." does not, without more constraints, preclude the existence of additional identical elements in the process, method, product, or device that includes the element.

[0081] A person skilled in the art should understand that the one or more implementations of the present specification can be provided as a method, a system,
30 or a computer program product. Therefore, the implementations of the present specification can use a form of hardware only implementations, software only implementations, or implementations with a combination of software and hardware. In addition, the implementations of the present specification can use a form of a computer program product that is implemented on one or more computer-usable

storage media (including but not limited to a disk memory, a CD-ROM, an optical memory, etc.) that include computer-usable program code.

[0082] The implementations of the present specification can be described in the general context of computer executable instructions executed by a computer, for example, a program module. The program module usually includes a routine, a program, an object, a component, a data structure, etc. for executing a specific task or implementing a specific abstract data type. The implementations of the present specification can alternatively be practiced in distributed computing environments. In the distributed computing environments, tasks are executed by remote processing devices that are connected through a communications network. In the distributed computing environment, the program module can be located in both local and remote computer storage media including storage devices.

[0083] The implementations of the present specification are described in a progressive way. For same or similar parts of the implementations, mutual references can be made to the implementations. Each implementation focuses on a difference from the other implementations. Particularly, the system implementation is basically similar to the method implementation, and therefore is described briefly. For related parts, references can be made to related description in the method implementation.

[0084] The previous descriptions are merely implementations of the present specification, and are not intended to limit the present application. For a person skilled in the art, various modifications and changes can be made to the present specification. Any modification, equivalent replacement, improvement, etc. made within the spirit and the principle of the implementations of the present specification shall fall within the scope of the claims in the present application.

CLAIMS

1. A method for processing a web application package, the method comprising:
determining a resource required by a web application comprising determining a jar package
and class information in the jar package, a page rendering control file, and a view resource that are
5 required by the web application;
storing the resource, and determining a resource address corresponding to the resource
comprising:
storing the page rendering control file and the view resource;
obtaining a storage address of the page rendering control file and the view resource; and
10 determining the storage address as the resource address;
generating a configuration file of the class information, so that a class loader is established
based on the configuration file when the web application package is loaded; and
generating a web application package that comprises the resource address and the
configuration file, wherein the web application package does not comprise the resource
15 corresponding to the resource address.
2. The method according to claim 1, wherein generating the web application package that
comprises the resource address comprises:
packaging a specified resource according to a predefined rule, and generating the web
20 application package that comprises the resource address.
3. The method according to claim 1, wherein generating the web application package that
comprises the resource address comprises:
generating a resource reference file that comprises the resource address; and
25 generating the web application package that comprises the resource reference file.
4. The method according to claim 1, the method further comprising:
compiling a source code into a class file; and
wherein the web application package comprises the class file but excludes the source code.
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5. The method according to claim 1, wherein the view resource comprises a sound file, a
picture, or a video that is used to display a web page.

6. The method according to claim 1, the method further comprising:
deploying the web application package on a web server.

5 7. An apparatus comprising a processor configured to perform the method of any one of claims
1 to 6.

8. A computer program product comprising instructions which, when the program is executed
by a computer, cause the computer to carry out the method of any one of claims 1 to 6.