SYSTEM, METHOD AND IMAGE ANALYSERS FOR INFORMATION HANDLING SYSTEM IMAGE NETWORK COMMUNICATION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates in general to the field of information handling system manufacture, and more particularly to a system and method for information handling system image communication over a network to a manufacture location.

Description of the Related Art

As the value and use of information continues to increase, individuals and businesses seek additional ways to process and store information. One option available to users is information handling systems. An information handling system generally processes, compiles, stores, and/or communicates information or data for business, personal, or other purposes thereby allowing users to take advantage of the value of the information. Because technology and information handling needs and requirements vary between different users or applications, information handling systems may also vary regarding what information is handled, how the information is handled, how much information is processed, stored, or communicated, and how quickly and efficiently the information may be processed, stored, or communicated. The variations in information handling systems allow for information handling systems to be general or configured for a specific user or specific use such as financial transaction processing, airline reservations, enterprise data storage, or global communications. In addition, information handling systems may include a variety of hardware and software components that may be configured to process, store, and communicate information and may include one or more computer systems, data storage systems, and networking systems.

Businesses often order multiple numbers of information handling systems for manufacture with predetermined software configurations so that the information handling systems will arrive at the business ready for use. The software configurations generally include specified operating systems and applications as well

as customization settings, such as hard disc drive partitions, network settings, application settings, user profiles and data, and even desktop settings. In some instances, businesses will prepare an image of a hard disc drive having the desired software configuration and will provide the image to the information handling system manufacturer for copying to manufactured information handling systems. The businesses will send the image to the information handling system manufacturer who, in turn, sends the image to various development and fulfillment centers for manufacture preparation. Once the business image is tested and prepared for promotion to the factory, the image is sent to the manufacture location for copying to manufactured information handling systems. The manufactured information handling systems are then sent to the business with the desired image ready to interact with the business' information technology environment.

One difficulty with the manufacture of information handling systems using customer images is that the images are generally large in size and thus take considerable time to transfer by network communication. For instance, a typical notebook information handling system image has multiple gigabytes of information and takes hours to communicate through networks to overseas manufacturing sites. Additional delays are often introduced by the initial communication of the image from the customer to the manufacturer and communication of the image within various manufacturer development and fulfillment centers for testing and manufacture preparation. Further, storage of images at various manufacture centers consumes considerable memory resources for the extended time period during which the images are communicated, tested and used. Overall, the manufacture of information handling systems with images provided by customers and communicated by networks through the manufacturer centers generally imposes relatively high storage, network and management costs, as well as decreased customer satisfaction due to delays in manufacture and delivery of ordered information handling systems.

SUMMARY OF THE INVENTION

Therefore a need has arisen for a system and method which more efficiently communicates information handling system images over networks for manufacture of information handling systems with an image.

In accordance with the present invention, a system and method are provided which substantially reduce the disadvantages and problems associated with previous methods and systems for manufacture of information handling systems with an image. An image is analyzed to identify a traits definition that allows re-creation of the image, and the traits definition is communicated over a network to a manufacture location. The traits definition is applied at the manufacture location to re-create the image for copying to an information handling system.

More specifically, an order site image analyzer accepts an image from a customer site and analyzes the image to identify the operating system, applications and unique information, such as registry settings and application forms and templates. An image decompressor decompresses the image for analysis by a settings engine, mapping engine and application engine that create an image traits definition XML file. For instance, the image traits definition has a schema with elements to identify the operating system including service packs and patches, the applications including forms and templates, registry settings including video resolution, network and power management settings, and other custom configuration information including hard disc drive partitions, computer name, local account, domain name, modem and desktop settings. The image traits definition is communicated by a network to a distal manufacture site image rebuilder that re-creates the image from an image component library and the unique information. The re-created image is then copied to manufactured information handling systems to ship to the customer that ordered the image. In one embodiment, the image analyzer resides at the customer site to create the image traits definition at the customer site for communication to the manufacturer, thus reducing customer use of network resources to communicate an image to a manufacturer for manufacture of an information handling system.

The present invention provides a number of important technical advantages. One example of an important technical advantage is that substantially less information is actually communicated in the transfer of an image traits definition than an entire image. The image traits definition essentially represents an image DNA that allows reproduction of a cloned image at the manufacture site with traits defined by an original image. An information handling system is built with the cloned image in substantially less time since the delays of communication of the entire image are not

experienced. Further, overhead costs of network and storage capacity are substantially reduced due to the reduced size of the image traits definition compared against the size of the complete image. For example, a common portable information handling system image has a size of multiple gigabytes while the traits definition for that image has a size of around 20 kilobytes.

In a first aspect, the present invention provides a system for manufacture of information handling systems, the system comprising: an image analyzer operable to accept an image and generate an image traits definition, the image traits definition having a manifest of the image's software characteristics and customization settings; and an image rebuilder distal to and interfaced with the image analyzer through a network, the image rebuilder operable to apply the image traits definition to an image components library to rebuild the image; and an information handling system burn rack proximate to the image rebuilder and operable to copy the rebuilt image to a manufactured information handling system.

The image analyzer may comprise an image decompressor operable to decompress the image; a settings engine operable to determine customization settings of the decompressed image and to store the settings in the image traits definition; and an application engine operable to determine the software characteristics and to store the software characteristics in the image traits definition.

The customization settings may comprise video resolution, network and power management settings. The software characteristics may comprise application names, application templates, application forms and application settings.

The image traits definition may be an XML file having a schema with plural elements. The elements may comprise an operating system, application, operating system update, custom configuration and desktop setting elements.

The image analyzer may be proximate an information handling system manufacturer order site operable to receive images from customers.

The image analyzer may be proximate an information handling system customer order site operable to communicate an information handling system order to a manufacturer.

In a second aspect, the present invention provides a method for manufacture of an information handling system having an image, the method comprising: creating the image to have an operating system, plural applications and unique information; analyzing the image to create an image traits definition that identifies the operating system, plural applications and unique information; communicating the image traits definition over a network to an information handling system manufacture site; re-creating the image from the image traits definition and a component library having the operating system and plural applications; and copying the re-created image to a manufactured information handling system.

The step of creating the image may further comprise creating the image at a customer site and the step of analyzing the image may further comprise analyzing the image at a manufacturer order site.

The method may further comprise shipping the manufactured information handling system to the customer site.

The step of creating the image may further comprise creating the image at a customer site and the step of analyzing the image may further comprise analyzing the image at the customer site.

The method may further comprise: communicating the image traits definition from the customer site to a manufacturer order site; re-creating the image at the manufacturer order site; and testing the re-created image before communicating the image traits definition to the manufacture site.

The image traits definition may be an XML file.

The unique information may comprise configuration settings and application templates and forms.

The configuration settings may comprise hard disc drive partitions, the operating system, applications, user profile information, video resolution, power management and network settings.

The network may comprise the Internet.

In a third aspect, the present invention provides a method for manufacture of an information handling system with an image, the method comprising: analyzing the image to create an image traits definition XML file, the image traits definition identifying the image operating system, applications and unique settings; communicating the image traits definition over a network to a manufacture site; re-creating the image at the manufacture site with the image traits definition; and copying the re-created image to an information handling system.

The analyzing may further comprise comparing a registry template with the registry of the image to determine at least some of the unique settings.

The analyzing may further comprise determining templates and forms associated with at least one image application and storing the templates and forms as unique settings.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be better understood, and its numerous objects, features and advantages made apparent to those skilled in the art by referencing the accompanying drawings. The use of the same reference number throughout the several figures designates a like or similar element.

Figure 1 depicts a block diagram of a system for creation of an image traits definition, communication of the traits definition to a distal location and re-creation of the image from the traits definition for manufacture of an information handling system;

Figures 2A and 2B (referred to herein as Figure 2) depict an example of an XML schema for an image traits definition; and

Figure 3 depicts a flow diagram of a process for manufacture of an information handling system with an image traits definition.

DETAILED DESCRIPTION

Manufacture of information handling systems with an image is performed with consumption of less network and memory resources by creating an image traits definition, communicating the traits definition to a distal manufacturing site and re-creating the image from the traits definition for copying to manufactured information handling systems. For purposes of this disclosure, an information handling system may include any instrumentality or aggregate of instrumentalities operable to compute, classify, process, transmit, receive, retrieve, originate, switch, store, display, manifest, detect, record, reproduce, handle, or utilize any form of information, intelligence, or data for business, scientific, control, or other purposes. For example, an information handling system may be a personal computer, a network storage device, or any other suitable device and may vary in size, shape, performance, functionality, and price. The information handling system may include random access memory (RAM), one or more processing resources such as a central processing unit (CPU) or hardware or software control logic, ROM, and/or other types of nonvolatile memory. Additional components of the information handling system may include one or more disk drives, one or more network ports for communicating with external devices as well as various input and output (I/O) devices, such as a keyboard, a mouse, and a video display. The information handling system may also include one or more buses operable to transmit communications between the various hardware components.

Referring now to Figure 1, a block diagram depicts a system 10 for creation of an image traits definition 12 from an information handling system image 14, communication of traits definition 12 to a distal location and re-creation of image 14 from traits definition 12 for manufacture of an information handling system 16. Information handling system image 14 is created by a customer at a customer site 18 to meet that customer's specific goals by including a desired operating system, desired applications and unique information. The unique information generally configures information handling system 16 to interact with customer site 18 in a desired manner and includes configuration information as well as forms and templates for the applications. The configuration information defines the operational

parameters of information handling system 16, such as the hard disc drive partitions, power management and video resolution, the user profile such as the owner and computer name, the network settings such as the location, domain and modem settings, and the desktop settings. Typically, customers configure images for ordered information handling systems so that the systems as delivered by the manufacturer to customer site 18 are prepared to enter an operational state with little delay or customer site manipulation. Information handling system image 14 is then communicated by network 20, such as the Internet, to a manufacturer order site for testing and copying to manufactured information handling systems.

Customer images are accepted from network 20 by an order site image analyzer 22, which analyzes the images to identify the operating system, applications and unique information for creation of image traits definition 12. An image decompressor 24 decompresses the image to its installed form for analysis by a settings engine 26. Settings engine 26 determines the operating system and applications of the image and extracts the custom configuration information. For instance a registry template finds settings from the operating system registry, such as the video resolution, network and power management settings. A mapping engine 28 maps settings from any outdated configurations to up-to-date configurations. For instance, operating system upgrades, patches and service packs that alter registry settings from earlier operating system versions are mapped to the earlier versions so that image traits definition 12 will support an image having an updated operating system. An application engine 30 analyzes the decompressed image to identify unique information associated with applications, such as forms and templates. Order site image analyzer 22 then saves the identified information to an image traits definition having Extensible Markup Language (XML) schema such as that depicted by Figure 2. The XML schema includes elements adequate to support re-creation of information handling system 14, such as the operating system name, the customer applications, the operating system service packs and patches, custom configuration information and desktop settings.

Once order site image analyzer 22 creates image traits definition XML file 12, image traits definition 12 is sent through network 20, such as the Internet, to a

manufacture site image rebuilder 32. Manufacture site image rebuilder 32 reads the attributes from the XML schema of image traits definition 12 to re-create information handling system 14. The software components for the image re-creation, such as the operating system and applications, are called from an image components library 34 and populated with the custom configuration and other unique information of image traits definition 12. The re-created image is then provided to an information handling system burn rack 34 for copying to manufactured information handling system 16. By identifying the "DNA" of the image, image traits definition 12 substantially reduces the amount of information that is communicated in order to transfer an image 14 across a network 20. In alternative embodiments, image analyzer 22 may be located at customer site 18 so that the customer communicates the image traits definition 12 to order information handling systems having image 14. In such an embodiment, the manufacturer distributes image rebuilder 32 at the various manufacturer sites that use the full image, such as for testing.

Referring now to Figure 3, a flow diagram depicts a process for manufacture of an information handling system with an image traits definition. The process begins at step 36 with creation of an information handling system image. At step 38, the image is communicated to a manufacturer for copying to an ordered information handling system. At step 40, the image is decompressed so that, at step 42, the settings are read with a registry template to identify the operating system, applications and custom configuration information of the image. At step 44, the information is mapped to adjust for any updates to the operating system and, at step 46, custom application information, such as forms and templates are read. At step 48, an image traits definition is created from the identified information to have adequate description of the image for subsequent re-creation of the image. At step 50, the image traits definition is communicated across a network, such as the Internet, to a manufacture site. At step 52, the image is recreated from the image traits definition and an image component library at the manufacture site so that the image mirrors the original image communicated to the manufacturer. At step 54, the re-created image is copied to manufactured information handling systems for shipment to the customer that defined the image.

Although the present invention has been described in detail, it should be understood that various changes, substitutions and alterations can be made hereto without departing from the spirit and scope of the invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. An image analyser for receiving an image of an information handling system and for creating an image traits definition thereof, the image analyser comprising:

a settings engine operable to determine an operating system and applications of the information handling system from the image and to extract custom configuration information for the information handling system from the image;

a mapping engine operable to map settings from outdated configurations to up-to-date configurations;

an application engine operable to analyse the image to identify unique information associated with applications; and

means for saving the obtained information in the image traits definition.

2. An analyser as claimed in Claim 1, wherein the settings engine determines settings of an operating system registry.

3. An analyser as claimed in Claims 1 or 2, wherein the unique information comprises forms and/or templates.

4. An analyser as claimed in Claims 1, 2 or 3, further comprising an image decompressor operable to decompress the received image.

5. An analyser as claimed in any preceding claim, wherein the settings comprise video resolution, network and power management settings.

6. An analyser as claimed in any preceding claim, wherein the image traits definition is an XML file having a scheme with plural elements.

7. An analyser as claimed in Claim 6, wherein the elements comprise an operating system, application, operating system update, custom configuration and desktop setting elements.

8. A method of generating an image traits definition from an image of an information handling system in an image analyser, the method comprising:

determining an operating system and applications of the information handling system from the image and extracting custom configuration information for the information handling system from the image;

mapping settings of the image from outdated configurations to up-to-date configurations;

identifying unique information of the image associated with applications; and

saving the obtained information in an image traits definition.

9. The method of Claim 8, wherein the image traits definition is an XML file.

10. The method of Claim 9, wherein the image traits definition comprises configuration settings and application templates and forms.

11. The method of Claims 8 to Claim 10, wherein the configuration information comprises hard disc drive partitions, the operating system, applications, user profile information, video resolution, power management and network settings.

12. The method of Claim 11, further comprising comparing a registry template with a registry of the image to determine at least some unique settings of the image.

13. The method of Claim 12, further comprising determining templates and forms associated with at least one image application and storing the templates and forms as unique settings of the image.

14. A method for manufacture of an information handling system comprising a method as claimed in any of Claims 8 to 13.

15. An image analyzer for receiving an image of an information handling system and generate an image traits definition, the image analyzer comprising:

an image decompressor operable to decompress the image;

a settings engine operable to determine customization settings of the decompressed image and to store the settings in the image traits definition; and

an application engine operable to determine the software characteristics and to store the software characteristics in the image traits definition.

16. An analyser as claimed in Claim 15, wherein the software characteristics comprise application names, application templates, application forms and application settings.

17. An analyser as claimed in Claim 15 or Claim 16, wherein the settings comprise video resolution, network and power management settings.

18. An analyser as claimed in any one of Claims 15 to 17, wherein the image traits definition is an XML file having a scheme with plural elements.

19. An analyser as claimed in Claim 18, wherein the elements comprise an operating system, application, operating system update, custom configuration and desktop setting elements.

20. A system for communicating an information handling system image through a network, the system comprising:

an image analyzer as claimed in any one of Claims 1-7 and 15-19, the image analyzer being operable to analyze an image to define predetermined factors; and

an image rebuilder distal to and interfaced with the image analyzer through the network, the image rebuilder operable to apply the predetermined factors to re-create the image.

21. The system of Claim 20 wherein the image analyzer is proximate an information handling system manufacturer order site operable to receive images from customers.

22. The system of Claim 20 wherein the image analyzer is proximate an information handling system customer order site operable to communicate an information handling system order to a manufacturer.

23. A method for manufacture of an information handling system having an image, the method comprising:

creating the image at a first location;

analyzing the image to create defined predetermined factors according to the method of any one of Claims 8-13;

communicating the predetermined factors over a network to a second location;

re-creating the image from the predetermined factors at the second location.

24. The method of Claim 23 wherein the first location comprises a customer site and analyzing the image further comprises analyzing the image at a manufacturer order site.

25. The method of Claim 24 further comprising:

copying the re-created image to a manufactured information handling system; and

shipping the manufactured information handling system to the customer site.

26. The method of Claim 23 wherein the first location comprises a customer site and wherein analyzing the image further comprises analyzing the image at the customer site.

27. The method of Claim 26 wherein the second location comprises a manufacture site, the method further comprising:

communicating the predetermined factors from the customer site to a manufacturer order site;

re-creating the image at the manufacturer order site; and

testing the re-created image before communicating the predetermined factors to a manufacture site.

28. The method of Claim 23 wherein the network comprises the Internet.

29. A method for manufacture of an information handling system with an image, the method comprising:

analyzing the image to define predetermined factors according to the method of any one of Claims 8-13;

communicating the predetermined factors over a network to a manufacture site;

re-creating the image at the manufacture site with the predetermined factors; and

copying the re-created image to an information handling system.