

A SYSTEM AND METHOD FOR CONFIGURING MULTIPLE SUBSYSTEMS

FIELD OF THE INVENTION

This invention relates to a system and method for configuring multiple subsystems. More particular, it relates to a system and method for planning, deploying, setting up and documenting for multiple subsystems.

BACKGROUND OF THE INVENTION

An industrial software system is often designed based on multi-tier architecture and consist of multiple sub-systems, whereby each subsystem can be strategically deployed on separate physical computers in a computer network as a way to improve overall system performance and scalability. During the deployment of such software system, it is necessary to install and setup each subsystem individually (either locally on that computer, or remotely using Remote Desktop or similar technologies) and specify the computer names of other sub-systems in the network, which the subsystem is dependent upon, and cross-reference each other to form the entire system

It is not uncommon that when deploying such software system having multiple sub-systems to computers in the network, there is no readily available configuration data to install and setup each subsystem individually on the network of computers. Currently, setup and installation is performed in a haphazard manner without the aid of documented configuration data, that is, either the user has remembered the data or data that are gathered as and when deployment of sub-systems to any networked computer is required. The reason for this is because during the planning stage there is no proper tool available to capture configuration data. The upshot of the lack of configuration data is that more often than not erroneous configurations would occur and render the system not usable, causing loss of the precious downtime. This problem is compounded when the number of sub-systems in a system configuration increases.

An example of the existing software system in the industry is illustrated in Figures 1 to 7. As shown in Figure 1, the multiple subsystems form the Plant Resource Manager (PRM) system. It also shows the dependencies among the subsystems and the required subsystems to form the minimum PRM system configuration in order to work or to be functional. In an actual deployment, these subsystems can be installed either on one single computer, or on different computers to distribute the load among these subsystems. Either way, the relationship between any two related subsystems must be established during the deployment, by associating the dependent subsystem to another subsystem of which it is depending upon. For example, in a minimum PRM configuration, the computer names (or network address) of the computers running “PRM Server” subsystem and “FBCom” subsystem, respectively, must be made known to the “PRM Client” subsystem, whereas the computer name of the computer running “FBCom” subsystem must be made known to “PRM Server” subsystem and “PRM Client” subsystem.

Figure 2 shows a typical system deployment process. During the planning phase, the overall system configuration is designed and planned based on the scope and objectives defined. The system configuration includes decisions such as which optional subsystems should be included, and whether to deploy the system in one single computer or multiple computers. The output of the planning process, however, is usually not an integral part of the deployment process, often in a person’s mind, on papers, or created by a general purpose software tool, such as, Microsoft Word, Microsoft Visio ®, Microsoft Excel ® or any other software that a person may choose to use in aiding the planning process. Loosely based on this output, the system is deployed and be installed on designated computers.

Figure 3 shows the flow of installation for deploying all PRM subsystem in one single computer. It shows that the relationships among related subsystems must be established after the installation by setting up the individual sub-system. To simplify the installation process for users, the setting up of each individual subsystem is usually automated by implicitly associating the subsystem to the same computer of which the subsystems are installed in.

The flow of installation for deploying PRM subsystems on separate computers, on the other hand, is more complicated. It is necessary to install and setup each subsystem individually and properly to maintain the system integrity. Adding to the complexity is the need to pay special

attention to whether or not optional subsystems are installed as part of the PRM system configuration.

Figures 4, 5 and 6 show the flows of installation for deploying PRM Server, Advanced Diagnosis and PRM Client, respectively, on different computers.

The flow of installation for FBCom and Diagnostic Historian subsystems are similar, except that they require no further setup after the installation for specifying the connections to other subsystems because they are not dependent on any subsystem.

Figure 7 shows an example of the setup tool for setting up a subsystem. In this example, Advanced Diagnosis subsystem can be setup by specifying the computer names of the associated FBCom, PRM Server, and Diagnostic Historian. The entry of the computer name for Diagnostic Historian, however, is optional depending on whether a Diagnostic Historian subsystem is included in the PRM system configuration.

Thus, there is a need for a system and method for planning, deploying, setting up and documenting a software system consisting of multiple subsystems that be run on multiple networked computer. In particular, there is a need to deploy a software system having multiple sub-systems to computers in the network, so that there is a readily available configuration data to install and setup each subsystem individually on the network of computers.

SUMMARY OF THE INVENTION

In accordance with a first aspect of the invention, there is provided a system for configuring multiple subsystem, the system comprising a Graphical User Interface (GUI) having a first region and a second region, a plurality of computer identifiers in the first region, an inputting device for selecting the computer identifiers from the first region and for establishing the relationship between the computer identifiers being selected, a system configuration being formed, a second region for deploying the system configuration, a display for displaying the system configuration, an installing section for installing software in one or more computers, the software comprising the system configuration, a validating section for validating the system, and a storage section for saving the system configuration.

Preferably, the first region is a palette area and the second region is a work area.

Preferably, the inputting device comprises a selector and a line generator.

Preferably, the inputting device may further comprise additional computers, each computer being designated to run on a subsystem.

Preferably, the relationship between the computer identifiers being selected is established in a combining subsystem section.

In accordance with a second aspect of the invention, there is provided a method for configuring multiple subsystems, the method comprising providing a Graphical User Interface (GUI) having a first region and a second region, storing plurality of computer identifiers in the first region, selecting the computer identifiers from the first region, deploying the computer identifiers into the second region for planning and displaying visually a system configuration, installing software in one or more computers, the software comprising the system configuration, validating the system, and saving the system configuration.

Preferably, the first region is a palette area and the second region is a work area.

Preferably, the computer identifiers represent a template of computers running a particular system.

Preferably, the computer identifiers are deployed for configuring one or more subsystems, where each subsystem is linked to another.

BRIEF DESCRIPTION OF THE DIAGRAMS

Figure 1 shows multiple sub-systems forming the Plant Resource Manager (PRM) in the prior art.

Figure 2 shows a typical deployment process, which is divided into planning, installation and setup after installation in the prior art.

Figure 3 is another prior art showing an installation flowchart for deploying all PRM sub-systems in one single computer.

Figures 4 to 6 show an installation flowchart for deploying PRM Server, Advanced Diagnosis and PRM Client respectively in the prior art.

Figure 7 shows prior art showing a sample menu of the PRM Setup Tool for setting Advanced Diagnosis.

Figure 8 shows a Graphical User Interface (GUI) of the Setup Tool according to one preferred embodiment of the present invention.

Figure 9 shows a flowchart showing the overview of the Deployment Process by utilizing the tool and the tool's scope of use according to one preferred embodiment of the present invention.

Figure 10 shows a block diagram of the Graphical User Interface (GUI) of the Setup Tool according to one preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention generally provides a system for configuring multiple subsystems. In particular, the system comprises a Graphical User Interface (GUI) having a first region and a second region, a plurality of computer identifiers in the first region, an inputting device for selecting the computer identifiers from the first region and for establishing the relationship between the computer identifiers being selected, a system configuration being formed, a second region for deploying the system configuration, a display for displaying the system configuration, an installing section for installing software in one or more computers, the software comprising the system configuration, a validating section for validating the system, and a storage section for saving the system configuration.

Figure 8 shows a preferred embodiment of the tool of present invention. In particular, it shows the Graphical User Interface (GUI) of the software system indicated by numeral 100. The software system consists of a first region 101 and a second region 102, which may be known as palette area 101 and work area 102 respectively. The palette area 101 store a plurality of computer identifiers or icons, each of which represents a template of a computer running a particular subsystem 111, 112, 113, 114, 115 or more or a logical grouping of sub-systems. When in use, the computer identifiers are deployed onto the palette area 101 so that a predetermined relationship between the computer identifiers is displayed visually on the graphical user interface.

When in use, the user selects an icon from the palette area 101 that represents his desired set of the system configuration 121 to be deployed onto the work area 102. A user may add an icon to the system configuration set 121. As discussed earlier, an icon represents a computer designated to run a particular subsystem 122, and specify the network name of the computer. Computers designated to run other sub-systems 123, 124, and 125 may be added to the system configuration set 121, and the names of these computers specified accordingly.

The subsystems contained within the same system configuration set are considered to be related to each other, and the connections and relationships among the sub-systems can be calculated and derived automatically during the deployment based on the dependencies or the relationship profile of each sub-system. The user may also add another independent system

configuration set 131 or more to the work area 121. The sub-systems contained within different system configuration sets are independent from each other.

The user may include two or more sub-systems 132 to a designated computer, which is intended to cater for small scale configuration a single computer is designated to run multiple sub-systems.

The user may also add additional computers 141 for sub-systems that have the capability of being associated with more than one system configuration set, whereby the icon is placed outside the system configuration, with lines 142 and 143 being drawn to indicate its relationship to other system configuration sets.

The lines can also be used to explicitly specify the relationships among subsystems within a system configuration set when the system configuration set alone is not able to resolve the ambiguity of relationships among the sub-systems within it. For example, within system configuration set 131, subsystem 135 can potentially be associated to subsystem 134 and 138, and similarly, subsystem 133 can also potentially be associated to subsystem 134 and 138. By using the lines, the user may use line 137 to explicitly specify the relationship between subsystem 133 and subsystem 134, and line 138 to specify the relationship between subsystem 135 and subsystem 136. In contrast, in system configuration set 121, there is no need to specify the relationship between subsystem 123 and subsystem 124 because the relationship is already implicitly established by the system configuration set 121.

Figure 9 shows the overall deployment process when the software system is employed. The planning stage 901 has been described in Figure 8 previously, where it has been explained in details how the computer identifiers are deployed onto the second region so that a predetermined relationship between the computer identifiers is displayed visually on the graphical user interface.

After the computer identifiers are deployed onto the second region, so that a predetermined relationship between the computer identifiers is displayed visually on the graphical user interface, the user would proceed to install the software system comprising of the graphical user interface on the respective computers automatically by utilizing the configuration data created by

the tool in step 902. In step 903, the subsystem software is setup on the respective computers automatically after installation by utilizing the configuration data created by the tool. In step 904, the user documents the system configuration with the tool and change the subsystem related settings subsequently if necessary.

Figure 10 shows the block diagram of the present invention. During the planning stage, the user would select an icon using an inputting device, such as a keyboard 1000. As discussed earlier, a computer identifier or an icon represents a computer designated to run on a particular subsystem, and specify the network name of the computer. The keyboard 1000 comprises a selector 1001 and a line generator 1002.

A purpose of the selector 1001 is for the user to select one or more subsystems 1004 from the palette area 1003. A user may add one or more subsystems 1004 to the system configuration set. In other words, the user selects one or more subsystems 1004 from the palette area 1003 that represents his desired set of the system configuration (1006, 1007, 1008) to be deployed onto the work area. Another purpose of the selector 1001 is for the user to select additional computers (1009, 1010, 1011), in which each computer is designated to run on a particular subsystem. Thereafter, the selector 1001 would automatically add the additional subsystems to the palette area 1003.

After the user selects the subsystems 1004 from the palette area 1003, the line generator 1002 is used by the user to establish a relationship between these subsystems 1004. In particular, the relationship between these subsystems 1004 is established in the combining subsystem section 1005. After the relationship between these subsystems 1004 is established, the desired set of the system configuration (1006, 1007, 1008) is deployed onto the work area and subsequently displayed visually on the display 1012.

Thereafter, the user would proceed to install the software system comprising system configuration on the respective computers. The installation of the software is performed in the installing section 1013. The subsystem software is setup on the respective computers automatically after installation by utilizing the configuration data created by the tool. The user documents the system configuration with the tool and may change the subsystem related settings subsequently if necessary.

Thereafter, the system validates, in the validating section 1014, whether the system configuration set created is valid or complete for the system to function by analyzing the relationship profile of each subsystem, which may include:

- a. The cardinality of the subsystem with respect to the system configuration set. This describes whether the subsystem is mandatory or optional, and the minimum and maximum number of such subsystem to be associated to a system configuration set, or
- b. Relationship requirements or restrictions of the subsystem with respect to other sub-systems. This describes whether the association between this subsystem and the other known subsystem is mandatory or optional, and / or the minimum and maximum number of such associations, or
- c. Relationship requirements or restrictions of the subsystem with respect to system configuration sets other than the one it is originally associated with. This describes whether a subsystem can be associated with one or more system configuration sets, and the minimum and maximum number of such associations.

After validating the system, the system saves the configuration data in the storage section 1015, which includes information for system configuration sets, names of the computers associated with the system configuration sets, types of sub-systems to be deployed and associations among sub-systems for subsequent application in the actual deployment. The configuration data is used to determine the subsystem software to be installed on a particular computer and the connection settings of the subsystem to other sub-systems installed on other computers. The tool also allows the user to save unfinished configurations as a draft so that configuration could be resumed at a later time.

During deployment, the relationship between any two sub-systems must be established by associating the dependent subsystem to the subsystem that it depends on. For example in Figure 1, in a minimum PRM configuration, the identification of the computer or network address of the computer running PRM server subsystem and “FBCom” subsystem, respectively, must be made known to the PRM Client sub-system, whereas the computer name of the computer

running “FBCom” subsystem must be made known to “PRM Server” subsystem and “PRM Client” sub-system.

When installing the system software on a designated computer during the deployment, the installation program determines the name of the computer automatically from the operating system and analyzes the configuration data created previously. From the configuration data, the installation program determines the intended sub-systems for the computer and installs those sub-systems accordingly. The configuration data also enables the installation program to setup the sub-systems accordingly by specifying the names of the computers designated to run other sub-systems of which the sub-systems are dependent upon.

After deployment has been executed, graphical representation of the system configuration displayed on the tool could be saved as an image of a configuration diagram for documentation purposes. Additionally, after deployment the tool allows the user to setup or change the subsystem setting on the designated computers either locally or over the network

Although exemplary embodiments of the present invention have been shown and described, it will be apparent to those skilled in the art that various modifications and variations to the invention as described herein may be made. Accordingly, it is to be understood that the invention is to be limited only as expressly put forth in the following claims.

Claims:

1. A system for configuring multiple subsystem, the system comprising:
 - a Graphical User Interface (GUI) having a first region and a second region,
 - a plurality of computer identifiers in the first region,
 - an inputting device for selecting the computer identifiers from the first region and for establishing the relationship between the computer identifiers being selected, a system configuration being formed,
 - a second region for deploying the system configuration,
 - a display for displaying the system configuration,
 - an installing section for installing software in one or more computers, the software comprising the system configuration,
 - a validating section for validating the system, and
 - a storage section for saving the system configuration.

[INVENTOR – PLEASE CONFIRM IF THE STORAGE SECTION IS A NECESSARY FEATURE TO ACHIEVE THE DESIRED RESULT]

2. The system according to claim 1, wherein the first region is a palette area and the second region is a work area.
3. The system according to any one of the preceding claims, wherein the inputting device comprises a selector and a line generator.
4. The system according to any one of the preceding claims, wherein the inputting device may further comprise additional computers, each computer being designated to run on a subsystem.
5. The system according to any one of the preceding claims, wherein the relationship between the computer identifiers being selected is established in a combining subsystem section.

6. A method for configuring multiple subsystems, the method comprising:
 - providing a Graphical User Interface (GUI) having a first region and a second region,
 - storing plurality of computer identifiers in the first region,
 - selecting the computer identifiers from the first region,
 - deploying the computer identifiers into the second region for planning and displaying visually a system configuration,
 - installing software in one or more computers, the software comprising the system configuration,
 - validating the system, and
 - saving the system configuration.
7. The method according to claim 6, wherein the first region is a palette area and the second region is a work area.
8. The method according to any one of claims 6 or 7, wherein the computer identifiers represent a template of computers running a particular system.
9. The method according to any one of claims 6 to 8, wherein the computer identifiers are deployed for configuring one or more subsystems, where each subsystem is linked to another.