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Machine Cloning

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ABSTRACT

Middleware systems which integrates with front end and back-end systems in any enterprise solutions play an important role in a monolithic setup of an enterprise. Most of the middleware systems are file or XML based and not RPM packages as Linux or other Operating Systems define. These file and XML based softwares give us opportunity to Clone a system and build a new one which saves time and money. Many existing tools and solutions in the market right now talk about Operating System cloning but rarely talk about software cloning. We are going to address few such methods and procedure to achieve this.

Keywords— *Machine Clone*

1. INTRODUCTION

This paper highlights the importance of middleware systems cloning which is rarely discussed. Middleware systems are the heart of any enterprise solutions in major and minor companies. Middleware systems behave like a hub between front-end and backend systems. Multiple companies offer middleware softwares to implement a solution for an enterprise. In the age of time and money if a new middleware system needs to be installed and setup it takes weeks if not months to get it up to speed. Of course this includes the steps of H/W allocation, OS installations, Software installations, SDLC cycle, testing and Production and not to forget hours of coding to achiever the results. We have many tools and solutions to clone a H/W machine. Some call it Physical clone, some call it Virtual machine clone and some even go further of cloning containers or functions. Yes some of the solutions might work but in a monolithic environment Containers or functions have no place. Hence a physical machine or Virtual machine is the only way to go about. We all know how machines like Physical or Virtual can be cloned. But what next? Can a software be cloned? To be specific can a middleware setup be cloned? Yes. It is doable and it solves lot of complexities and more importantly saves huge amount of time and money.

2. DETAILS

2.1 Types

There are mainly three types of middleware components for an enterprise application. Two of them fall under on-premises setup while the third is a hosting solution on a Cloud. When we talk about the on-premises types, one is the package installation type which can be installed by any package manager by an Operating System. For example using RPM package manager in Linux to install kernel packages, or underlying Java packages installation. The third type is also common which uses a file based or XML based existence.

When I say XML based existence, in lay man terms I mean it replicates a directory structure with XML and configuration files which form the entire existence of this software. We are going to talk about such middleware software and there are tons of such products which follow this existence approach.

2.2 Folder Structure

In the XML or file-based middleware software products, the main configuration files are maintained in XML formats, property files. Most of the JAVA based middleware software products are XML dependent and follow simple folder structures. There is usually a Storage Area Network or a Network Access Storage file system dedicated to such installation. This is done to retrieve the file system incase of a disaster recovery. Linux or Windows the folder structure and files are similar except the O.S compatibility notation. The root folder, followed by configuration folders and internally exists the XML and other property files where all the configuration is written and held.

The configuration files are so accessible that manual changing of these files can alter the look and feel of the software. The configuration files are very susseptable and often needs to be protected in terms of restricting access to these types servers which host critical environments like Production environments where the actual user operations and requests are serviced.

2.3 Analysis

Before we discuss about the procedure to perform the middle software cloning lets look at the contents of these XML and other important files in these types of installations. Though there are many references of a server in the XML files the one's we need to focus are the Hostname, IP's, Nodes, Clusters and Domain or Cell names.

2.3.1 Hostname: Hostnames are the machine names for any server. If you want to clone or replicate a server you pick a server with the hostname defined. The IP can be a variable but the hostnames are embedded in these XML files. If the XML files consist of IP's, these can be manually replaced with Hostnames.

2.3.2 Node: Node names are user defined names for a node, you can use any name for a node for representation purpose. These names are important from the software perspective as distinct machines are identified with these names.

2.3.3 Cluster: A Cluster is a logical representation of a grouping of a set of servers together which host an enterprize application. The main purpose of a cluster is to provide load balancing and high-availability. But they are important as they provide robust setup of an enterprise application inside the middleware software platforms.

2.3.4 DomainCells: These are the highest level of representation of an environment in the middleware software environment set-up. They hold Hostnames, Nodes, Clusters in their configurations.

Each of the above components have distinct XML configuration files holding specific information about them. Every configuration file is important which holds any of this information in them.

3. PROCEDURE

As I mentioned in the above sections about Hostnames, Nodes, Clusters and DomainCells form the 4 pillars of any XML based middleware product installation, lets jump into how to achieve a Clone.

Let's take an example for a clear understanding. Imaging you have a machineA which is hosting a Linux Operating System and a middlware software setup which in turn is hosting an enterprise application. This environment is thoroughly setup and testing over the years and its running at full steam in Production. The application it is hosting is also fool proof from any vulnerabilities or bugs and all is good. Now you want a replica of this server to create a similar machineB.

The system administrators in an enterprise might be able to help clone your machine but their responsibility does not include the software part. Let's look at the steps involved.

Step 1: Clone machineA

This step involves in cloning the actual operating system of machineA. If this machine is a virtual machine your job is easy, if it's a physical machine there can be a snapshot taken and a new machine is built.

Step 2: After Clone of machine A

After cloning this machineA, make sure it is pointing to a different IP and the DNS server is updated. At this point you have 2 machines machineA and machineB which are pointing to two different IP's on the same network. This is not possible, hence the new machine has to be connected to a new subnet. As two machines with the same hostnames cannot exist in the same network using the same Domain Name Server hosting.

Step 3: Changing Configuration

Remember I mentioned these installations are XML based, now do a master search for the Hostname, Node, Cluster and DomainCell from the root directory on the new machineB. You woud typically identify configuration files, log files, temporary files, property files, security files, script files and finally Directory names with them.

Use a find command if in Linux and replace the Hostname with the new Hostname, Node name with the new node name, Cluster name can remain the same and finally DomainCell name with the new name in the XML and property files. The Log files can be deleted as they only carry the previous machine's log content. The security files are important and cannot be easily tampered with. Most of the times the old security files should work but you notice any security errors then follow this. Most JAVA applications security or other DB files can be recreated with OpenSSL or the software provided key file handlers. Generate new database files and import any root and intermediate certficates as needed. Make sure the new DB files are placed at the exact location as old files. Update the directory names as they do not cause any issue. Replace the contents of the property files with the new names.

Helpful Command: Use the below command in a Unix environment to search for a particular name and replace it with new name.

```
grep -rl "<old_hostname>" * | xargs sed -i -e 's/<old_hostname>/<new_hostname>/g'
```

If there are web servers on the same machine make sure the configuration files related to those web servers are also replaced. These are important to establish a communication between a web and the application servers hosting the enterprise application.

4. ADVANTAGES

The main advantage of cloning a middleware software is time. It saves weeks or months of work. How? Its not just a software cloning, we are actually cloning every configuration, fix, updates, deployment, releases, patchiness, ever don on this machine is cloned. Hence it

is an important topic to discuss and study about.

5. CONCLUSION

As a conclusion this procedure is strictly towards a monolithic middleware setup which hosts a monolithic enterprise application. The goal of this paper is not to find shortcuts but to inform that there exists a process Clone process which saves valuable time if a similar machine is desired. This approach is suitable for proof of concepts and development machines or stand boxes but not recommendable for Production environment. Also, please keep in mind the licensing agreements before trying such an approach. Such machine is still subject to licensing terms. And finally, if any issues arise while cloning a machine, remember the installation is a XML based and the file can be re copied anytime and the whole exercise can be repeated.

