Singularity

Installation Guide

Empowering People with Information that *Moves*

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Version 1.0 - M2

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Revision History

Name	Date	Reason For Changes	Version
Tom Rose	2001-01-09	M2 Release	1.0-M2

Introduction

The purpose of this document is to define installation procedures for Singularity as well as the supporting software (i.e., Java, application server, and database), for Windows and UNIX based platforms.

Singularity Overview

Singularity is a distributed system that enables its services to run on different physical or virtual servers (if desired). Currently, there are three major installable components of Singularity: Event Process Manager (EPM), Configuration Manager (CM), and Device Manager (CM). For high level system layout please refer to the architecture and design documents in the document folder of the distribution.

Event Process Manager (EPM)

The EPM runs in a J2EE application and is deployed as an Enterprise Archive (EAR). It provides an Application Level Event (EPCglobal™ ALE 1.0 implementation), Complex Event Processing, Process Management, Configuration Management, and Administration services.

Configuration Manager (CM)

CM is a Jini service that can be deployed anywhere on the network. CM provides management and propagation of configurations for the Device Managers. CM also provides Jini lookup services as well as a codebase server for other Singularity services such as Device Managers to download their code. CM runs in any Java 5.0 Standard Edition (J2SE)

Device Manager (DM)

A DM is a Jini service that controls the individual devices on the Singularity network, such as RFID readers (handheld/fixed), printers, light stacks, etc. A DM can manage many devices (or just one) and there may be many DM instances deployed on the Singularity network. Upon startup a DM will request its configuration (assigned devices), and then load the subsequent software needed to communicate to its assigned devices as specified in the configuration. It receives the software and configuration information from any CM service that it can find on the network.

Within the Singularity framework DM interfaces can be created for almost any device, currently in the M2 release a DM service runs in J2SE 5.0

Emulators (EM)

For testing purposes emulators for RFID readers are also provided, and also run in J2SE 5.0. EM is a just a plain java service, and is not a Jini service.

Installation Overview

Singularity Requires an RDBMS (currently supports MySQL), J2EE 1.4 Application Server (currently supports JBoss), and Java 1.5.x (also referred to as Java 5.0, the version numbers are used interchangeably).

Specific instructions for the RDBMS (MYSQL), application server (JBoss), and Java, can be found in the following sections and must be done prior to installing Singularity. The application server and database of course can be installed on separate workstation/servers if desired.

If you are installing Singularity for the first time, plan on installing the EPM, CM, and DM on the same host. Then additional CM and DM services can be installed on different hosts to support more advanced deployment configurations.

Once the install is complete refer to admin.doc for how to navigate the admin console. http://<host>:<port>/admin (i.e. http://localhost:8080/admin).

Installation Prerequisites

1. Install Java

Each host that runs a Singularity component must have Java 5.0 Standard Edition JDK (J2SE) installed. The Appendix A. System Requirements (Java) has additional information on where to obtain Java for your specific platform.

After the installation ensure the Environment Variable JAVA_HOME is set to the currently location of your Java installation. The Windows environment variables can be viewed via Control Panel->System->Advanced. For UNIX systems /etc/profile should contain the system wide environment.

2. Install RDBMS

M2 release of Singularity has only been tested with MySQL 4.x and 5.x versions.

Singularity uses Hibernate (http://www.hibernate.org) for persistent object storage enabling it to use many commercial and open source RDBMS, without specific code for each RDBMS.

Links can be found in the Appendix A. System Requirements (Database) for the location of the MySQL download and documentation. Also any of the MySQL installation packages can be used.

If you need to install MySQL and are unfamiliar with the product, there is a Quick Setup Guide provided that can be found at http://singularity.firstopen.org/confluence/ for windows installation. If you already have MySQL 4.x or 5.x installed Skip to

"**Database Configuration**." If you use the Quick Setup Guide noted above, the **Database Configuration** section is also provided in that document.

Note: There are no specific MySQL configurations required, except it is recommended that the InnoDB engine be used for transaction support.

3. Database Configuration

Create database using any name (i.e. singularity). Remember the name you use as it will need it during the installation of Singularity. Singularity requires an account set up with privileges for Select, Insert, Update, Delete, Create, Drop, and Alter. This account does not need the Create and Drop, and Alter table privileges for runtime use of Singularity, so these privileges can also be removed after installation of Singularity.

4. Install Application Server

The EPM is an EAR that must be deployed in a J2EE application server. Currently Singularity M2 supports JBoss versions 4.0.2 and 4.0.3SP1.

Singularity has been tested in the 4.0.2 version with default server configuration, and in 4.0.3SP1 with the default server configuration.

If you already have JBoss installed and are familiar with JBoss, recommend that for the first installation of Singularity you copy a default configuration with no other applications deployed. Singularity does not add any libraries to the JBoss "lib" directory so it should not interfere with any other applications deployed in the same JBoss instance. However, its good practice to install in a clean environment first, then migrate other applications to the instance one at a time for integration testing.

If you need to install JBoss and are unfamiliar with the product, there is a quick setup guide provided that can be found at http://singularity.firstopen.org/confluence/ . If you already have JBoss installed Skip to "**Application Server Configuration**." If you use the Quick Setup Guide noted above, the **Application Server Configuration** section is also provided in that document.

Links can be found in the Appendix A. System Requirements (Application Server) for the location of the JBoss download and documentation.

5. Application Server Configuration

The only requirements for JBoss configuration is class loader isolation, and a J2EE 1.4 configuration. Recommend that you copy the default configuration with no other applications loaded for the first installation of Singularity.

Install Singularity

For the first installation of Singularity install all components on a single host, and then you can start to distribute the services after you become more familiar with the installation procedures.

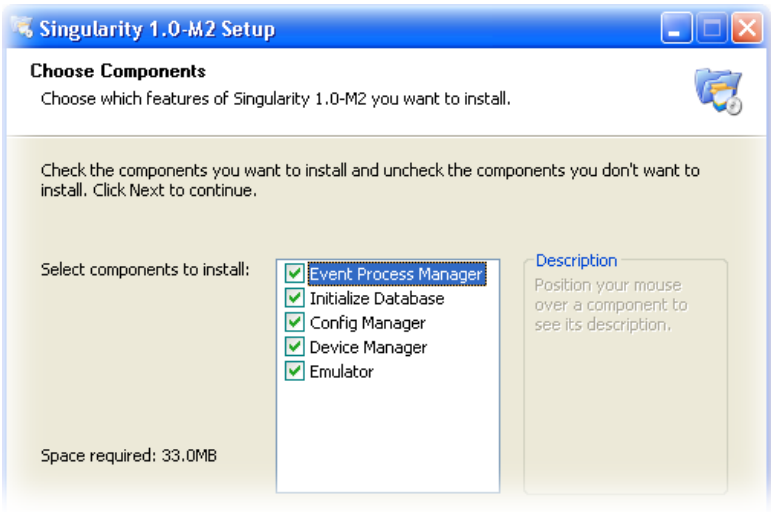
Singularity 1.0–M2 release provides a native installer for windows. However, for UNIX platforms simply unpack the binary image, and run the install script that initializes the database. Future releases of Singularity will have native packages such as RPM to support a clean installation and uninstall of Singularity on UNIX systems.

Windows Platform

Run the install/Setup.exe from the distribution.

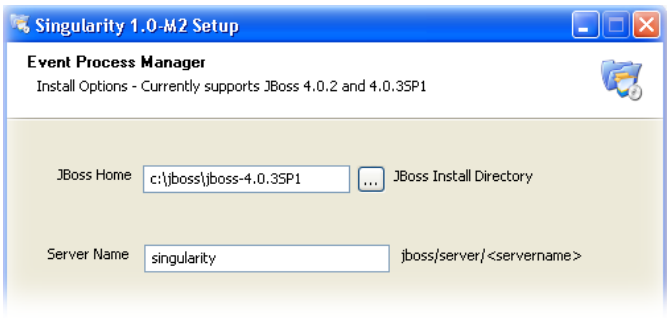
Note: ***DMSetup.exe*** *is for installing the Device Manger only on other hosts. It's the same software as the DM in the Setup.exe except all the other components are not packaged, to reduce the installer footprint.*

For the first installation choose all the components, by default they will all be selected, however, they can be installed separately. All components have one additional option screen, except for the Emulators. Each option has a screen shot and explanation below, although any option screen that appears in the installer and not shown in the document should be self explanatory. Also, the Initialize Database selection is not really a software component, but when selected will initialize a Singularity database.



Event Process Manager

If the JBOSS_HOME environment variable is set, the value will be populated on the option screen. The Singularity EAR will be deployed in <configurationname>/deploy directory (i.e. c:\jboss\jboss-4.0.2\server\<configurationname>\deploy)



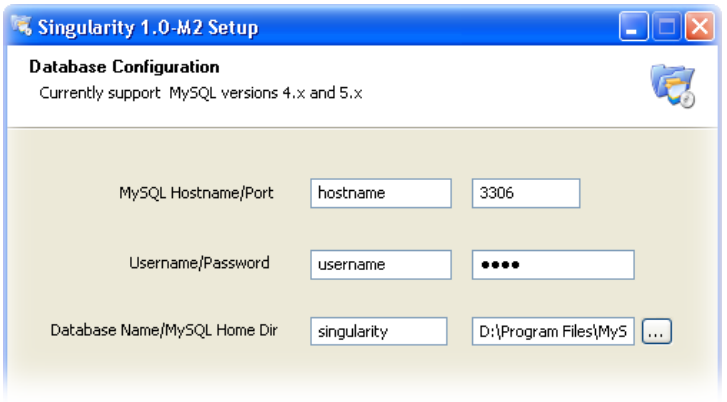
When the EPM is installed, an additional directory <configurationname>/**bin** will also be created that contains startup scripts to run JBoss as a service, and startup JBoss with a security manager. <configurationname>/conf will also have three additional configuration files created wrapper.conf, service.conf, service.policy to support the native service and command line startup scripts. You can use your current JBoss startup scripts, the only requirement is that you use a Security Manager.

For Authentication/Authorization Singularity uses a Security Realm called **SingularityRealm**, and a role of SingularityAdmin is required. If the security realm is not defined, JBoss will utilize its default realm. The default realm is just a file base realm that requires two files: <configurationname>/conf/users.properties, and <configurationname>/conf/roles.properties for authentication and authorization. The install will create these two files if they do not already exist. If you have already created these files for other applications, you just need to add the SingularityAdmin as a role, and assign a user that role.

Of course you are free to define SingularityRealm to use whatever security mechanisms you like, however, only the SingularityAdmin role has been defined for the M2 release to gain access to all functionality in Singularity.

Database Configuration

Enter the host the database is running on, 3306 is the default port. Username/password (default to admin/admin) is the account you would like Singularity to use. Then the database name (whatever name you created during the Database Install/Configuration prerequisite step, default is singularity), and finally the home directory of MySQL.

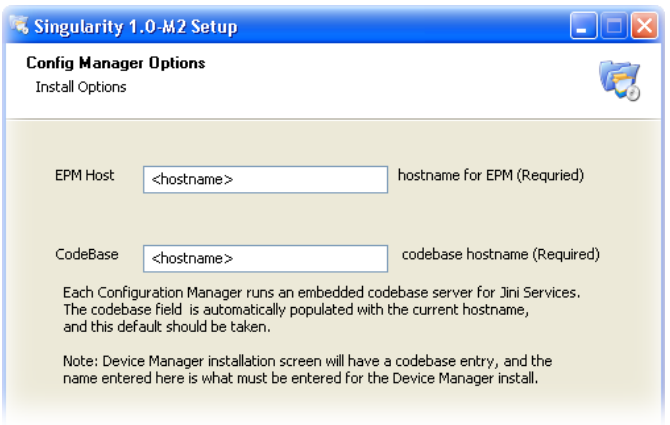


When **EPM** component is selected for install, the installer uses this information to generate and deploy a Data Source file, **singularity-mysql-ds.xml**, to the application server.

When the **Initialize Database** option is selected the installer will use this information to find the mysql.exe client software to run the DDL that creates the tables for Singularity. The MySQL Home Directory only has to be specified when this component is selected, and is just ignored if the Initialize Database option is not selected.

Note: <signularityhome>\db contains the DDL scripts to manually initialize the database as well.

Configuration Manager

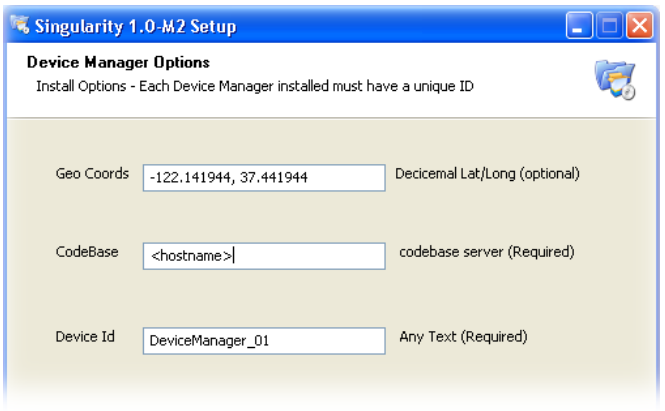


Enter the host name where EPM is running, this will default to the current host. Codebase must have a named host to associate with the code that will be served from the configuration manager to other services. Do not enter “localhost”, it will not work. This field should be populated for you, if not then see ControlPanel->System ComputerName tab find the name.

The codebase host allows Device Managers to remotely load their libraries based on their assigned configuration. The default for the codebase hostname is the current host, and should be used. The option to change it is for more elaborate deployment configurations, and you may already have a codebase repository used for other applications, in which case this one would not be needed. Make note of the codebase hostname as it will be required for Device Manager Deployment.

Device Manager

Enter the codebase hostname used during the CM options, it will default to the current host. Device Id, is a unique and arbitrary name for this device manger. Optionally, enter the geographical corrdinates of the device (decimal encoded lat/long), to identify the location of the device (just leave the default, or erase it). You can find your lat long by address at http://geocoder.us



During this installation process some of the Jini components are being installed, however, all Singularity libraries are downloaded at runtime from the codebase server. All of the software, except for a very thin activation component will ultimately be the only item installed with the device manger.

Note: Eventually configuration of the Device Managers will be dynamic as they discover who they are by what device they are on, and the physical peripherals (readers, printers, GPS, etc) that are attached to the device. They will only require the thin activation software to be installed, with no additional configuration.

This completes the windows installer.

UNIX Platform

Unzip singularity-1.0-m2.tar.gz or singularity-1.0-m2.zip

run **setup.sh –h** for the usage

The install is not automated for UNIX, few configuration files have to be updated for each of the component.

Event Process Manager

Edit the singularity-mysql-ds.xml put the hostname, port, database, and account information.

```
<connection-url>jdbc:mysql://<hostname>:<port>/<database></connection-url>
```

Database Configuration

run db/load.sh –h for the usage

Usage: ./setup.sh [-i <installdir>] [-h <appserver-home>] [-s <servername>] [options]

[options] default will install all

-d Install Device Manager
-c Install Config Manager
-e Install Emulator Manager
-p Install Event Process Manager

[defaults]
<installdir> = /usr/local/singularity/1.0-M2
<appserver-home> = /usr/local/jboss
<servername> = singularity

This directory also contains the DDL scripts to manually initialize the database if needed.

Configuration Manager

Edit cm/conf/id.properties file change <epmhost>, to the actual hostname EPM is running on. Other properties are not needed you can delete them or leave them.

Device Manager

Edit cm/conf/id.properties file change <id>, to the actual device manager ID (e.g. DeviceManager_01).

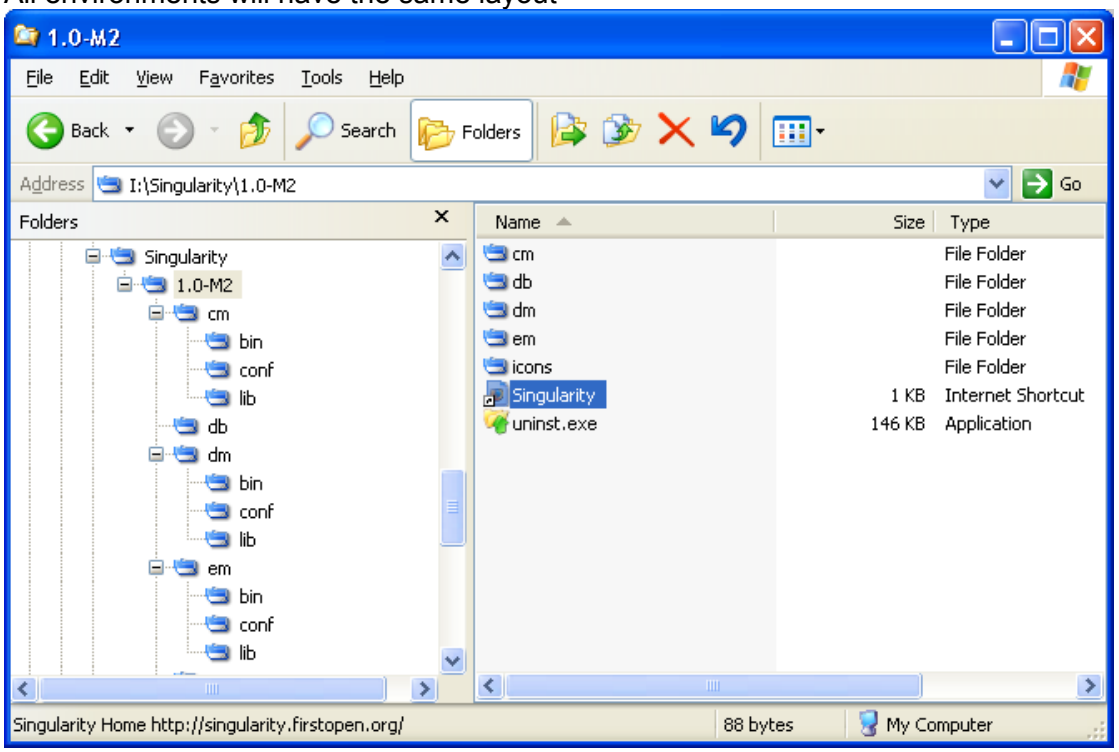
Post Installation

For the Windows platform there should be Start menu shortcuts for all components that will run the **StartService.cmd** for each. Windows services for all components should be installed as well.

After reading the following section, start the EPM only. Then refer to the Admin Console Guide (admin.doc) to start using the Admin Console (Web Application packaged in the EPM EAR). Once Device Profiles are created with the Console you may start the Configuration and Device Managers, as well as reader emulators. The Admin Guide will note when to start the other services. There is no other graphical user interface, except the Admin Console packaged with EPM.

Installed Directory Layout

All environments will have the same layout



Windows

The windows installed image is a little more complex that the UNIX version because of the native windows service wrapper (utilizing JavaService Wrapper). What is common to both Window and UNIX, and just executes plain Java are the following two scripts:

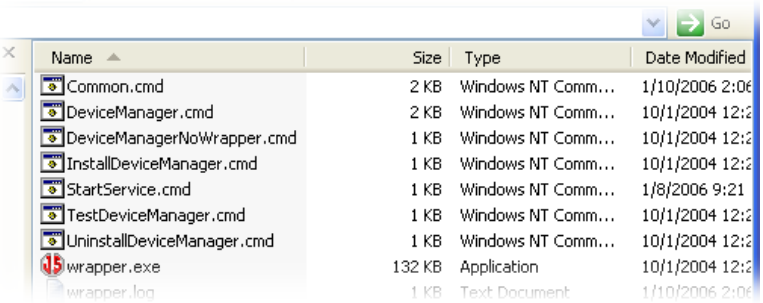
<servicename>/bin

Common.cmd	provides a common configuration for startup scripts.
StartService.cmd	startup script for the service.

The following are part of the JavaService Wrapper, and are scripts that can run from the command line for managing, testing and diagnostics of the Windows service. The two scripts mentioned before (Common, StartService) run completely without the native JavaService Wrapper.

<ServiceName>.cmd	start, stop, status the service commands.
<ServiceName>NoWrapper.cmd	test service without native wrapper
Install<ServiceName>	Install to the service manager
Test<ServiceName>	start service with native wrapper command line
UnInstall<ServiceName>	unInstall to the service manager
Wrapper.exe	native executable service stub.

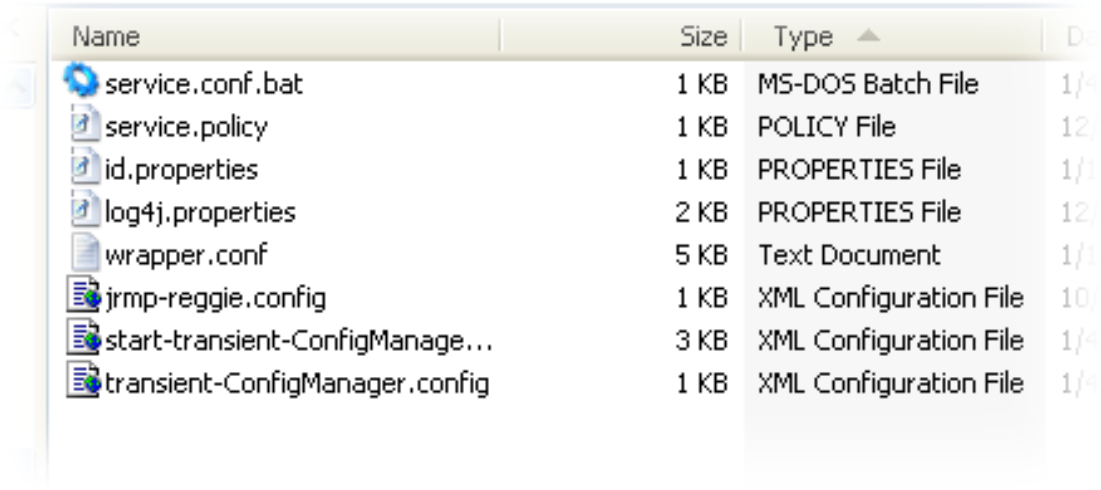
The installer will actually install to the Singularity Service in the Windows Service Manager, where you can start and stop the service like any native windows service.



Please refer to http://wrapper.tanukisoftware.org/doc/english/introduction.html for additional explanation and structure of the Java Service Wrapper.

Note: Singularity uses integration method 1, as outlined in the JavaService Wrapper documentation.

<servicename>/conf



service.conf.bat provides configuration plain java startup scripts

wrapper.conf provides configuration for the JavaService Wrapper

id.properties identification of itself, and external systems (if any).

log4j.properties Logging @see http://logging.apache.org/log4j/docs/

*.config these are jini configuration files for (DM/CM will have them).

<servicename>/lib
Directory provides supporting libraries for each component.

UNIX

<servicename>/bin

UNIX has a variety of ways of managing daemons depending on you platform, for now these scripts are the only startup scripts provided.

./common.sh provides a common configuration for startup scripts
./service.sh, startup script for the service.

*Note: for the emulators there is a configuration file <servicename>/conf/<emulator>service.conf (i.e awservice.conf). Starting an emulator requires the specific .conf file be specified, instead of taking the default of service.conf like the others.

command line would be as follows: **service.sh ../conf/awservice.conf** to start an awid emulator.

<servicename>/conf

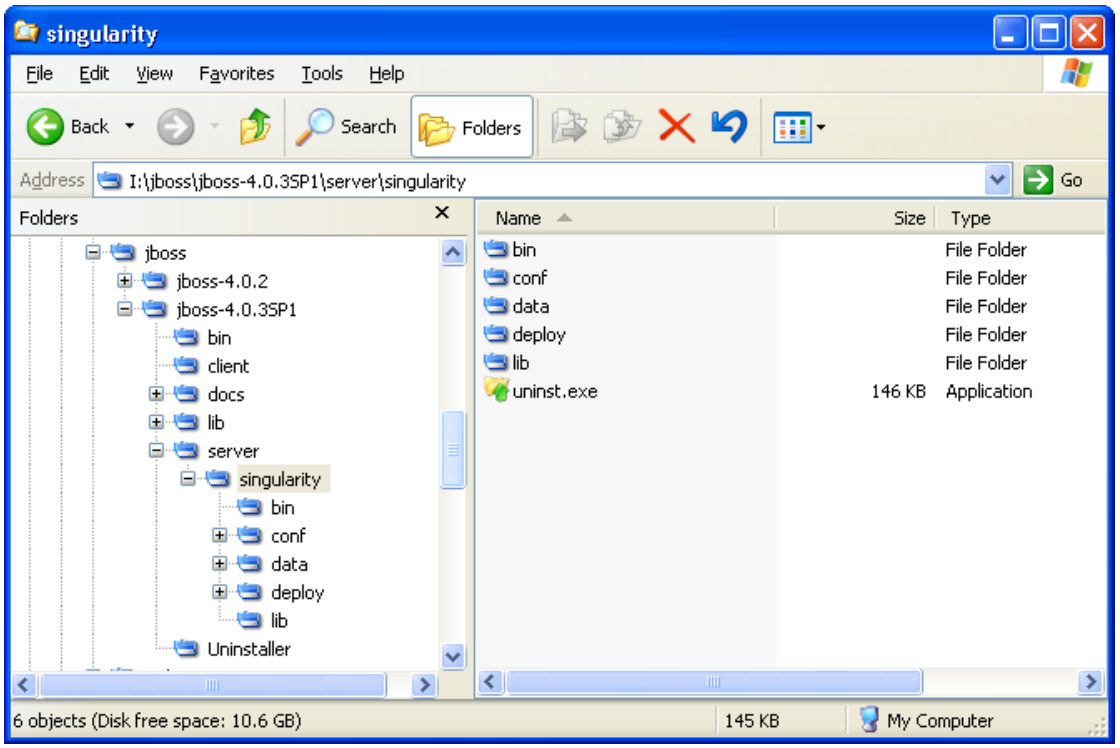
service.conf	provides configuration plain java startup scripts
id.properties	identification of itself, and external systems (if any).
log4j.properties	Logging @see http://logging.apache.org/log4j/docs/
*.config	these are jini configuration files for (DM/CM will have them).

<servicename>/lib

Directory provides supporting libraries for each component.

JBoss Installation Layout

<configuration>/bin and <configuration>/conf



Have the same files as noted above for other Singularity components.

Uninstall

Window

In the home directory of Singularity there will be a **uninst.exe** program to start the uninstaller. Each component can be removed separately.

UNIX

In the home directory of Singularity there will be an **uninstall** script that removes everything.

Appendix A - System Requirements

JDK 1.5.x, JBoss 4.x, MySQL 4.x & 5.x All are freely available and can be acquired from the locations listed below by category. Singularity can run on any platform that supports Java 1.5 (5.0) Virtual Machine.

Minimum Disk Space for a single host environment (~300MB):
Singularity 32MB (16MB EPM, 5MB DM, 10MB CM, 1MB EM)
Database 120MB
Application Server 100MB

Minimum Memory for single host environment 512MB, recommend 1GB.

Java

Singularity requires Java 1.5.x server Virtual Machine (JVM). The Java 1.5.x Java Runtime Environment (JRE) is only packaged with the client JVM, so for now the 1.5.x JDK must be installed to get the Server JVM. The JDK can be downloaded from the following locations depending on your platform. Please ensure the JAVA_HOME environment variable is set. The Windows environment variables can be viewed via Control Panel->System->Advanced

Also note that version numbers on JDK are undergoing some changes. Although for technical purposes the latest Java release is called 1.5, and its version identifier for marketing purposes is 5.0. They are the exact same product, there is no technical or licensing difference and the names are used interchangeable while Sun transitions to the new version identifiers.

Windows, Solaris, and Linux	http://java.sun.com/j2se/1.5.0/download.jsp
IBM AIX, Linux, z/OS	http://www-128.ibm.com/developerworks/java/jdk
Mac OS/X	http://www.apple.com/support/downloads/java2se50release1.html
BEA JRockit (Windows/Linux)	http://www.bea.com/framework.jsp?CNT=index.htm&FP=/content/products/jrockit/
*IRIX (1.5 JDK is not supported at this time)	http://www.sgi.com/products/evaluation/

Database

1.0-M2 Support

MySQL 4.x or 5.x	http://dev.mysql.com/

Singularity is using Hibernate as OR (Object Relational) Mapping and persistence services. DDL will be generated for all the below RDBMS platforms from the corresponding Hibernate Dialects in the 1.0 GA release (Currently using Hibernate 3.1).

DB2	Informix
DB2 AS/400	HypersonicSQL
DB2 OS390	Ingres
PostgreSQL	Progress
MySQL	Mckoi SQL
MySQL with InnoDB	Interbase
MySQL with MyISAM	Pointbase
Oracle (any version)	FrontBase
Oracle 9i/10g	Firebird
Sybase	Sybase Anywhere
SAP DB	Microsoft SQL Server

Application Server

JBoss 4.0.2 and 4.0.3SP1	http://www.jboss.com/products/jbossas/downloads

Singularity is meant to be supported on any J2EE 1.4 compliant application server, and JBoss is targeted for the 1.0 GA release. The following application servers will be supported in subsequent 1.x releases in 2006

Apache Geronimo	http://geronimo.apache.org/
IBM Websphere v6 Community & Commercial Editions	http://www-306.ibm.com/software/sw-bycategory/subcategory/SW620.html
BEA Weblogic 9.1	http://www.bea.com/framework.jsp?CNT=index.htm&FP=/content/products/weblogic/