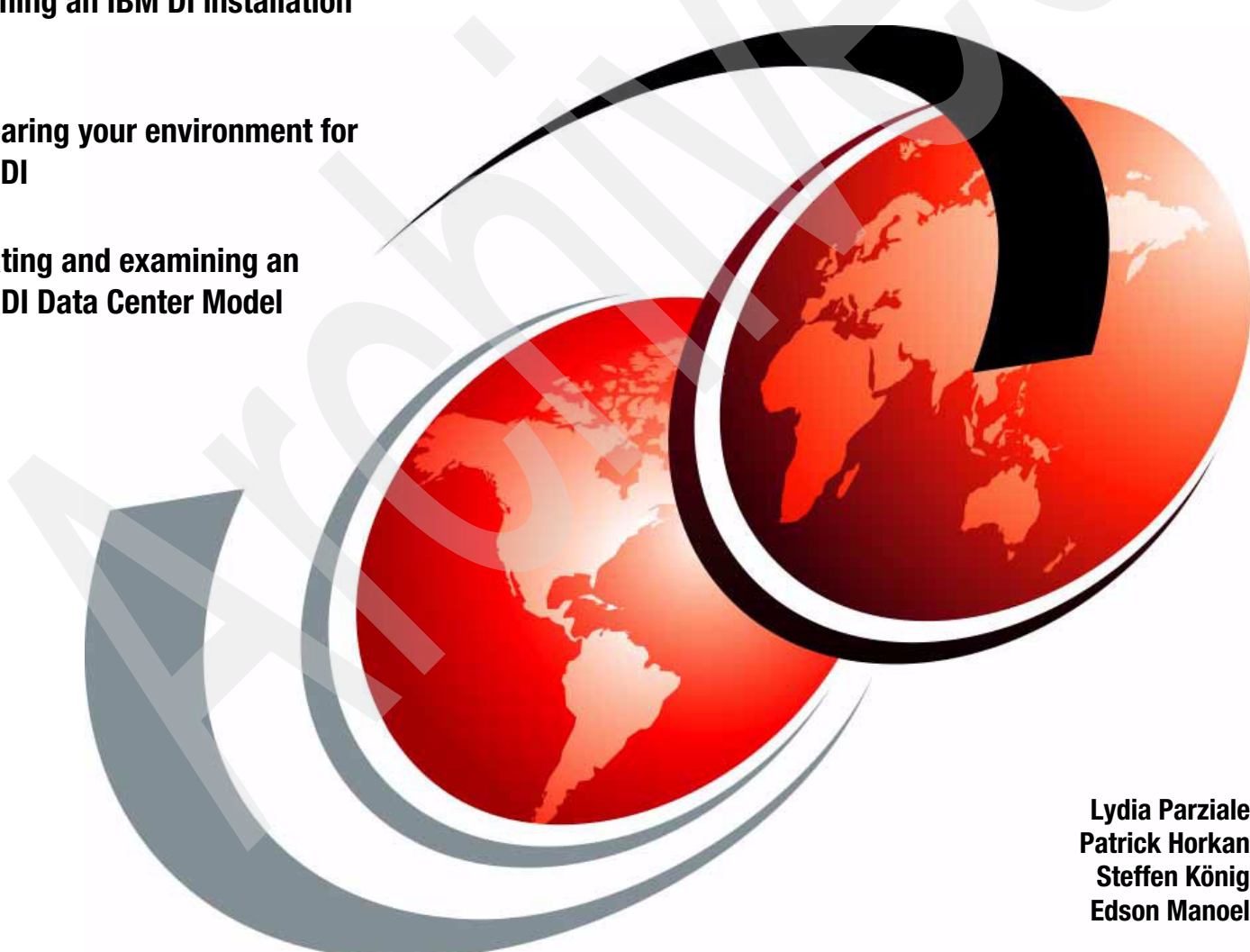IBM

IBM Dynamic Infrastructure for mySAP Business Suite on IBM zSeries

Planning an IBM DI installation

Preparing your environment for IBM DI

Creating and examining an IBM DI Data Center Model

Lydia Parziale
Patrick Horkan
Steffen König
Edson Manoel

Redbooks

ibm.com/redbooks

IBM

International Technical Support Organization

IBM Dynamic Infrastructure for mySAP Business Suite on IBM zSeries

September 2005

SG24-6473-00

Note: Before using this information and the product it supports, read the information in "Notices" on page v.

First Edition (September 2005)

This edition applies to Version 1, Release 0 of IBM Dynamic Infrastructure for mySAP Business Suite.

Contents

iii

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:
IBM Director of Licensing, IBM Corporation, North Castle Drive Armonk, NY 10504-1785 U.S.A.

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:
This information contains sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. You may copy, modify, and distribute these sample programs in any form without payment to IBM for the purposes of developing, using, marketing, or distributing application programs conforming to IBM's application programming interfaces.

v

Trademarks

The following terms are trademarks of the International Business Machines Corporation in the United States, other countries, or both:

@server®	DRDA®	Tivoli®
@server®	IBM®	Virtualization Engine™
eServer™	OS/390®	VTAM®
AIX®	pSeries®	WebSphere®
Distributed Relational Database	RACF®	xSeries®
Architecture™	Redbooks™	z/OS®
DB2 Connect™	Redbooks (logo) ™	z/VM®
DB2 Universal Database™	RACF®	zSeries®
DB2®	S/390®	

The following terms are trademarks of other companies:

Java, and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft Internet Explorer, Microsoft, Windows, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Intel, Pentium, Intel logo, Intel Inside logo, and Intel Centrino logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Other company, product, and service names may be trademarks or service marks of others.

Preface

In the on demand business environment of today, there is a need to better balance the demands for SAP computing resources and the supply of those resources. Dynamically provisioned SAP application servers assist administrators in providing business-required accountability and service level agreement compliance and management tools. IBM® Dynamic Infrastructure for mySAP Business Suite (IBM DI) Release 1 provides that accountability, while helping SAP administrators to manage their SAP environment.

This IBM Redbook helps you to visualize the components needed to transform a current IT infrastructure that includes mySAP Business Suite and DB2® for z/OS® into a true on demand environment by using the IBM Dynamic Infrastructure (IBM DI) for mySAP Business Suite Release 1. The book examines the mapping of a current infrastructure to a customized installation of IBM DI, and provides examples of an on demand solution in a heterogeneous environment which will enable customers to run their SAP environments more efficiently.

This redbook is intended for IT architects, SAP BASIS administrators, DB2 database administrators, network administrators, z/VM®, z/OS and Linux® systems programmers, as well as disk and storage administrators.

We recommend that each project participant read through the majority of this redbook to understand how and when their project activities relate to the activities of the other team members, and to also take note of any IBM DI-specific requirements for system setup.

The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization, Poughkeepsie Center.

Lydia Parziale is a Project Leader for the ITSO team in Poughkeepsie, New York. She has both domestic and international experience in technology management including software development, project leadership, and strategic planning. Her areas of expertise include e-business development and database management technologies. Lydia has been with IBM for 22 years, working in various technology areas.

Patrick Horkan is an IBM Field Technical Sales Specialist for SAP on zSeries® DB2. He has worked with both SAP R/3 and SAP BW over the past 10 years, and is one of the technical sales leads for the support of IBM Dynamic Infrastructure for the Americas. His areas of expertise include assisting customers in planning for and implementing complex multi-SAP application solutions when high availability or continuous operations are required. Patrick has 21 years of information technology experience.

Steffen König is a Developer for the IBM ODTS SAP on zSeries Development Team at the SAP Labs in Walldorf, Germany. He also participates in the development of the IBM Dynamic Infrastructure for mySAP Business Suite at the IBM Lab in Boeblingen, Germany. His areas of expertise include e-business development and SAP.

Edson Manoel is a certified IT Specialist with IBM who works at the ITSO, Austin Center, as a Senior IT Specialist in the systems management area. Prior to joining the ITSO, Edson worked with the IBM Software Group, Tivoli® Systems, and in the IBM Brazil Global Services Organization. He was involved in numerous projects that focused on designing and implementing systems management solutions for IBM Clients and Business Partners. Edson

holds a Bachelor of Science degree in Applied Mathematics from Universidade de Sao Paulo, Brazil.

Special thanks to the following people for their contributions to this project:

Become a published author

Join us for a two- to six-week residency program! Help write an IBM Redbook dealing with specific products or solutions, while getting hands-on experience with leading-edge technologies. You'll team with IBM technical professionals, Business Partners and/or customers.

Your efforts will help increase product acceptance and customer satisfaction. As a bonus, you'll develop a network of contacts in IBM development labs, and increase your productivity and marketability.

Find out more about the residency program, browse the residency index, and apply online at:

ibm.com/redbooks/residencies.html

Comments welcome

Your comments are important to us!

We want our Redbooks™ to be as helpful as possible. Send us your comments about this or other Redbooks in one of the following ways:

► Use the online **Contact us** review redbook form found at:

ibm.com/redbooks

► Send your comments in an email to:

redbook@us.ibm.com

► Mail your comments to:

IBM Corporation, International Technical Support Organization
Dept. HYJ Mail Station P099
2455 South Road
Poughkeepsie, NY 12601-5400

1

Introduction

Reducing total cost of hardware ownership is of paramount importance to the bottom line of business, yet hardware capacity must be matched to the maximum load of the applications that will be run. This means that while there are times when hardware is running at peak capacity, there are also times when hardware will be running at normal to lower than normal capacity.

IBM Dynamic Infrastructure (IBM DI) for mySAP Business Suite is the new systems management software that enables clients to achieve a better balance between the demand for SAP computing resources and the supply of those resources. IBM DI for mySAP Business Suite helps reduce total cost of ownership and improve the quality of service in SAP solution environments while supporting the SAP Adaptive Computing Infrastructure. IBM DI for mySAP Business Suite helps clients design and implement IBM DI for SAP solutions.

The IBM Dynamic Infrastructure for mySAP Business Suite dynamically allocates resources when and where they are needed. This means different systems running different SAP solutions such as mySAP ERP and mySAP CRM can allocate the resources necessary, whenever the demand peaks.

This IBM Redbook demonstrates IBM DI through the use of a fictitious customer, Dexter Petrol Company. The examples in this book will:

► Examine sample IBM DI workflows for an international company with a diverse, global presence

► Examine policies in IBM DI that will maximize the use of resources during peak workload times in each country

► Demonstrate cost transparency using IBM DI which provides metering and billing input

► Demonstrate how IBM DI helps administrators manage service level agreements and report on their compliance

This redbook will assist Information Technology Architects in designing a high level architecture that is built around their current infrastructure and incorporates the IBM DI infrastructure. It will also assist those responsible for preparing their entire environment for a successful installation of IBM DI. Finally, this redbook will demonstrate why IBM DI for mySAP Business Suite is an integral tool that enables both tactical and strategic hardware decision-making.

1

1.1 Dynamic provisioning concepts

A component of the IBM Virtualization Engine™, IBM DI for mySAP Business Suite is based on virtualization of resources and automation. Virtualization of resources and automation helps to create a flexible and responsive on demand environment. This virtualization of resources allows on demand retrieval of resources from a shared pool and assignment to different applications.

The dynamic allocation of resources is called *provisioning*, and it occurs under the management of IBM DI. Likewise, the relinquishing of resources, or *deprovisioning*, also occurs on demand under the management of IBM DI.

Using IBM DI to provision and deprovision servers as needed provides planning for hardware resources and can be done for "peak of the sums" rather than sum of the peaks. In other words, when planning hardware resources, you will no longer have to carry additional hardware to compensate for those times when your workload reaches peak performance. Instead, you can provision additional resources as needed from a pool of hardware resources currently not experiencing a peak in workload. When the workload returns back to normal performance, the servers are dynamically deprovisioned back into the pool, ready for use by other applications.

Our sample customer implementation

This chapter provides an overview of the business model that we created in order to demonstrate the capabilities of the IBM Dynamic Infrastructure for mySAP Business Suite. We start by introducing a fictitious company, called Dexter Petrol Company (DPC).

2.1 Organization overview

The Dexter Petrol Company is a global organization comprised of three divisions: Dexter Petrol Company of the Americas, Dexter Petrol Company of Asia Pacific and Dexter Petrol Company of Europe, Middle East & Africa (EMEA).

Like many global organizations, Dexter Petrol Company uses the enterprise resource planning tool (ERP) mySAP Business Suite to automate and integrate the majority of its business processes, to share common data and practices across the entire enterprise, and to produce and access information in a real-time environment.

2.2 Dexter Petrol Company and the "Follow the Sun" paradigm

As with other worldwide operating companies, Dexter Petrol Company uses the "Follow the Sun" systems operations paradigm. This paradigm describes how the Dexter Petrol Company utilizes its IT resources around the clock and throughout the globe.

A normal business day at DPC is characterized by having several workload peaks. These workload peaks usually occur in the morning, at noon, and in the evening.

Our example assumes that DPC EMEA starts its business day in the morning between 8 a.m. and 9 a.m. CET, at which time the IT infrastructure of DPC's EMEA division is confronted with an increasing application server load generated by massive user logons. At the same point, all other DPC divisions show a low or negligible resource utilization, due to the time difference between these divisions (the local time of DPC Asia Pacific would be between 4 a.m. and 5 a.m., while the local time of DPC Americas would be between 3 a.m. and 4 a.m.).

When DPC Asia Pacific reaches its peak point in the morning hours, all other divisions may show an average or low application server utilization. As shown in Figure 2-1, the tip of the utilization peak moves along the world time zones, reaching each division at a different time. Thus, we can describe this as a "follow the sun" paradigm, because the application server utilization follows the course of the sun.
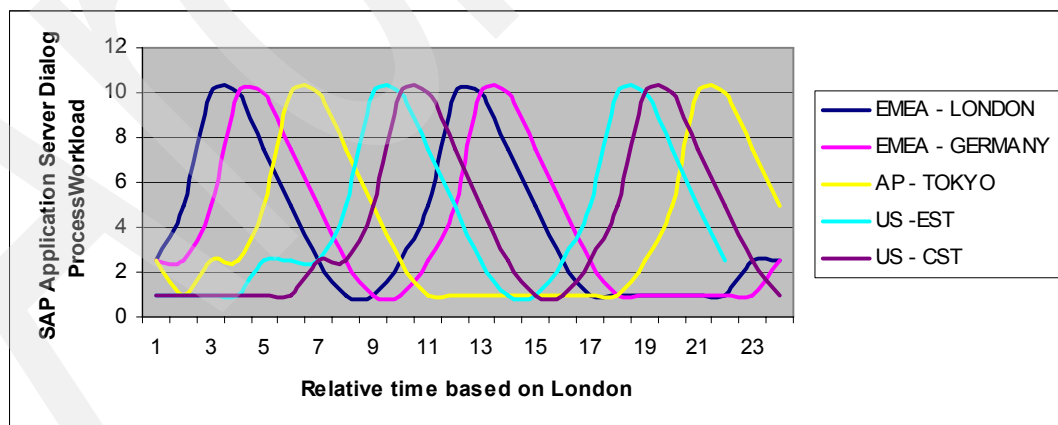
Figure 2-1   "Follow the Sun" performance peaks

By using the IBM DI for resource management, DPC does not have to provide a hardware and software infrastructure that is sized for the sum of the peaks, but rather, for the peak of the sums (for further details, refer to 1.1, "Dynamic provisioning concepts" on page 2).

The money spent on the resources to handle peak load performance is greatly reduced, so DPC's hardware and software resources are used more efficiently.

Another advantage this offers over current IT management solutions is that you are able to see precisely where resources from the DPC IT resource pool are being most used.

3

Infrastructures and architectures

This chapter describes the infrastructure prior to an IBM DI installation, and explains what we needed to do in order to use IBM DI. It explains the architecture of the system we developed, along with the reasons why we chose this architecture.

The chapter also explains the decisions involved in mapping a current installation to an IBM DI installation, and lists references you may find useful while performing this installation.

Before implementing the IBM Dynamic Infrastructure for MySAP Business Suite, you need to have a base SAP application and environment set up. In our case, we were building the environment from scratch.

We started by having a z/OS 1.6 operating system installed, and had a z/VM 5.1 environment built. Both of these were built on zSeries hardware. We also installed an SAP R/3 4.7 Enterprise 200 system, with the SAP application servers on Linux for zSeries and the database server on DB2 V7 in the z/OS LPAR. It was from this base systems landscape that we implemented the IBM Dynamic Infrastructure for MySAP Business Suite.

3.1 Infrastructure landscape

This section provides an overview of how we set up our overall infrastructure.

We set up the Dexter Petrol Company in a very small sandbox environment. *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Guide* discusses several topologies on several platforms, with multiple VLANs. You can adapt the information in this redbook to any of those topologies.

3.1.1 System landscape and operating systems

For testing purposes, we decided to set up a small system that followed the topology described in the Installation Guide for IBM DI. This topology is referred to as topology 3. It consists of two xSeries® management servers and a zSeries hosting the DB2 database server, the SAP central instance, the SAP dialog instance master server, the SAP configuration master server, and the SAP application server clones.

Figure 3-1 graphically represents our sandbox topology.
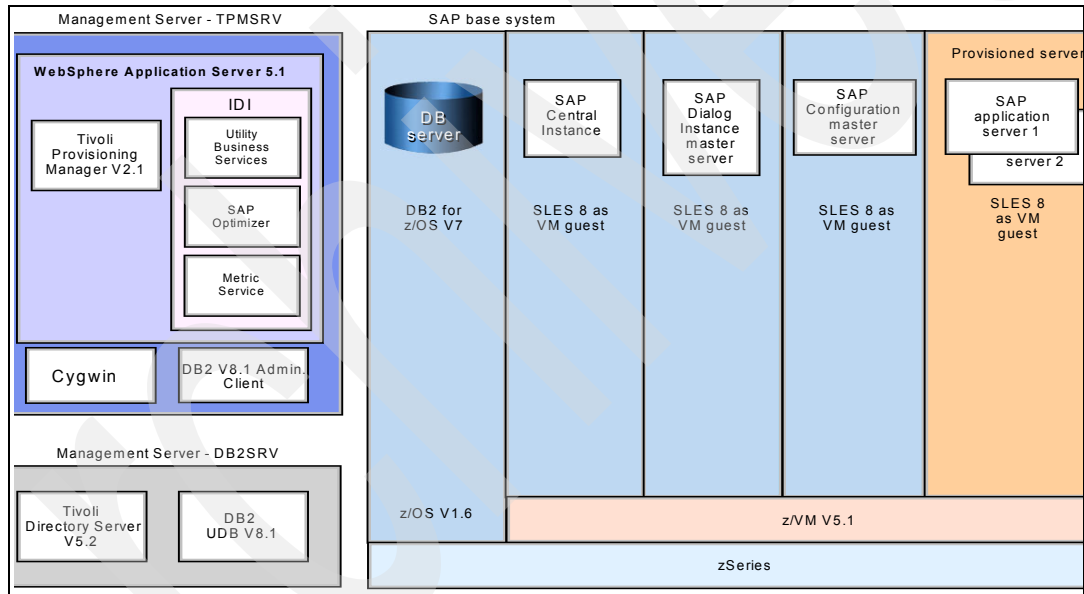
Figure 3-1   Our sandbox topology

For the management servers, we used two xSeries boxes equipped with Pentium® 4 3 Ghz CPUs, 1.5 GB of RAM, and 80 GB hard drives. The operating system used was Microsoft® Windows® Server 2003 - Standard Edition.

DB2 V7 ran on a zSeries z990 in a separate LPAR running z/OS 1.6. The SAP central instance, SAP dialog instance, SAP configuration master and all application server clones ran SUSE SLES8 Linux on zSeries under z/VM as guests. The z/VM Version we used was 5.1. For further information regarding the zSeries setup, refer to 3.2, "Our base SAP system setup" on page 12.

Table 3-1 on page 9 summarizes the operating systems used in this configuration.

Table 3-1   Operating system versions used

Component	Version	Level	Notes
Linux on zSeries	SLES8	SP3	kernel 2.4.21-251 glibc 2.2.5-108 saplocales 2.2.5-2 suse-sapinit-200403117-0
z/VM	5.1	-	-
z/OS	1.6	RSU 0502	-
MS Windows	Server 2003	-	Standard Edition

Note: All software maintenance listed as required in SAP OSS Note 81737 wss installed.

3.1.2 Network landscape

To keep our approach as simple as possible, we chose *not* to set up several subnetworks as described in the IBM DI Planning Guide. Instead, we merged the recommended ADMINLAN, CUSTLAN, and DBLAN to one subnetwork. In a real production environment, however, we *strongly* recommend that you set up several subnetworks to enhance overall network performance and to isolate multiple customer LANs.

To keep the Linux on zSeries network setup and configuration simple, and to ensure minimal system changes after cloning, we chose to make use of a vswitch in z/VM. This allowed us to define our SAP Linux on zSeries guests with a virtual device address for the network that could be duplicated for every Linux for zSeries system we needed to clone, without having to perform additional customization work.

You may want to implement additional networking configurations to support your internal requirements and sizing conditions. This could include the use of Hipersockets, additional VLANs, additional network interface cards (NICs), and additional switching.

Important: For our project, we used a single VLAN—but this is not recommended, as performance will suffer in a single VLAN environment.

3.1.3 IBM DI application landscape

The IBM DI consists of several distributed management components that carry out important tasks within the infrastructure; Figure 3-2 on page 10 illustrates these components.
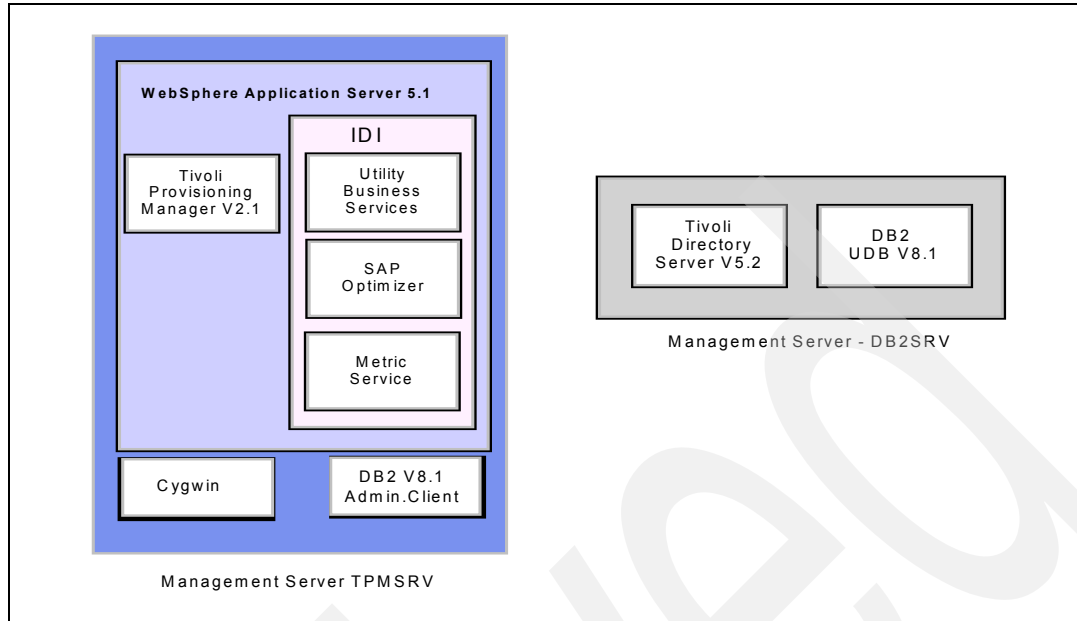
Figure 3-2   IBM DI management components

We distributed these components on two separate management servers, DB2SRV and TPMSRV. This approach is also referred to as a *two-node topology*, as described in the IBM DI Planning Guide.

As Table 3-2 shows, the server TPMSRV hosts all IBM DI-related components such as WebSphere®, Tivoli Provisioning Manager, and IBM DI.

Table 3-2   Components on management server TPMSRV

Component	Version	Patches/Fixes	Notes
Tivoli Provisioning Manager	2.1.0.0	-	The IBM DI Installation Guide refers to the Tivoli Provisioning Manager, but the Tivoli Intelligent Orchestrator Package has the same functionality.
WebSphere Application Server	5.1	Cumulative fix 4, MQ patch IC38409	Recommended fix pack 3, but fix pack 4 worked for us as well.
IBM Dynamic Infrastructure for mySAP Business Suite	Release 1	-	-
DB2 Admin. Client	8.1	Fix pack 3	-
Cygwin	1.5.14-1	-	-
SAP Java™ Connector (JCo)	2.0.10	-	-
Java	1.4.2	-	-

Our other management server, DB2SRV, housed the IBM Tivoli Directory Server (ITDS), which provided a powerful Lightweight Directory Access Protocol (LDAP) identity

infrastructure. It also served as our DB2 database server, which supports both ITDS and TPM. See Table 3-3 for versions and patches that were applied to the software packages.

Table 3-3   Components on management server DB2SRV

Component	Version	Patches/Fixes	Notes
Tivoli Directory Server	5.2	Fix pack 2, Fix V3.ibm.at	-
DB2 UDB	8.1	Fix pack 3	-
Cygwin	1.5.14-1	-	-

3.1.4 SAP landscape

For our IBM DI setup, we used an SAP system 4.7 Enterprise kit with kernel version 6.20 patch level 1211 (updated to 1875 after installation) and appropriate maintenance. For further information regarding the SAP environment, refer to 3.2, "Our base SAP system setup" on page 12.

Table 3-4   Components of the SAP installation

Component	Version	Patches/Level	Notes
SAP system	4.7 Enterprise	Kernel 6.20, Patch level 1875	Must have at least SAP support pack 47 installed to support IBM Dynamic Infrastructure
DB2 for z/OS	V7	RSU 0502	+ 81737 maintenance recommendations

3.1.5 Desktop and laptop landscape

We installed Cygwin, IBM Personal Communications, PuTTY, and the SAPGUI to our laptops for ease of management. We already had the Mozilla and Microsoft Internet Explorer® Web browsers installed.

Cygwin was used for full support of x-windows and sftp. The SAP R/3 4.7 Enterprise x200 for zSeries DB2 software installation requires the installer to be able to export their display back to their desktop machine (or laptop in our case). Cygwin version 1.5.9-1 is also required for the proper installation of TPM. We downloaded Cygwin from:

http://www.cygwin.com/

IBM Personal Communications was used for connectivity to the z/OS system and the z/VM systems, as well as for login and initial IPL of linux guest images under z/VM.

PuTTY was used for ssh and telnet access. We obtained this software for download from:

http://www.chiark.greenend.org.uk/~sgtatham/putty/

The SAPGUI was available on our SAP installation media and was installed on each computer needing to use the SAPGUI. For testing connectivity between TPMSRV and the SAP system, we installed the SAPBUI there as well.

Useful references - overall infrastructure

We found the following publications to be useful references during this installation, configuration, and setup:

- ► *SAP on DB2 UDB for OS/390 and z/OS: Implementing Application Servers on Linux for zSeries,* SG24-6847
- ► *SAP on DB2 UDB for OS/390 and z/OS: Planning Guide SAP Web Application Server 6.20,* SC33-7959
- ► *Linux on IBM eServer zSeries and S/390: Systems Management,* SG24-6820
- ► *Linux on IBM eServer zSeries and S/390: Building SuSE SLES8 Systems Under z/VM,* REDP-3687
- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00
- ► IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1, BOEE-EUIN-00
- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP
- ► *SuSE Linux EnterpriseServer8 for IBM S/390 and IBM zSeries Installation Manual,* third edition, 2004
- ► *SuSE Linux EnterpriseServer8 for IBM S/390 and IBM zSeries Administration,* Edition 2004
- ► *SAP Software on UNIX: OS Dependencies,* Document Version 1.03, September 2004
- ► *SAP R/3 Enterprise on UNIX: IBM DB2 Universal Database for z/OS and OS/390 Installation Guide*

3.2 Our base SAP system setup

This section describes our SAP system installation, configuration and setup.

3.2.1 SAP database server

The SAP database server was an IBM zSeries z990 2084-318 in LPAR mode shared across multiple ITSO projects. Our database server LPAR name was SC04, with three logical processors defined, 2 GB memory, and an OSA Express GbE adapter.

The SC04 LPAR was running z/OS 1.6 and DB2 V7, both at maintenance level 0502. All maintenance required per the SAP service marketplace OSS message 81737 was installed.

Useful references - SAP database server

We found the following publications to be useful references during this installation, configuration, and setup:

- ► *SAP R/3 Enterprise on UNIX: IBM DB2 Universal Database for z/OS and OS/390 Installation Guide*
- ► *SAP Software on UNIX: OS Dependencies,* Document Version 1.03, September 2004
- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00
- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP

> ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

3.2.2 SAP central instance

The base SAP central instance runs in its own Linux on zSeries guest under z/VM.

The SAP code in the kit we received was FTPed from a pSeries® CD-ROM to the SAP central instance system, and was made available to other systems via NFS.

> **Attention:** If you use this method, you *must* mount the CD-ROM with the option to force all file names to upper case.

This SAP instance was created by running the SAP installation program SAPINST and choosing to install a central instance. We had some problems with the installation program code, but nothing out of the ordinary for an SAP installation. All SAP processes run on this system.

This instance is a part of the base SAP system and is not part of the IBM Dynamic Infrastructure setup.

This SAP system contains the main SAP files systems (/usr/sap/trans; /sapmnt; /usr/sap/M5D) and has exported these file systems via NFS so that the other SAP instances can mount them.

> **Important:** Any SAP application servers that are part of the IBM Dynamic Infrastructure system will need either to have a local copy of the SAP executables, or to mount the SAP executables (/sapmnt/M5D/exe) from the IBM DI Configuration Master system (sapcm), rather than from the SAP central instance.

We mounted the SAP DVD containing the installation kit service pack fixes to a separate Linux server within our environment and accessed this data via NFS.

3.2.3 Useful references - SAP central instance

We found the following publications to be useful references during this installation, configuration, and setup:

► *SAP R/3 Enterprise on UNIX: IBM DB2 Universal Database for z/OS and OS/390 Installation Guide*

► *SAP Software on UNIX: OS Dependencies,* Document Version 1.03, September 2004

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

3.2.4 SAP dialog instance

The base SAP dialog instance runs as its own Linux on zSeries guest under z/VM.

This SAP instance was created by running the SAP installation program SAPINST and choosing to install a dialog instance. We had no problems running this dialog instance installation. SAP Dialog processes are the primary code run on this system.

This instance is a part of the base SAP system and is not part of the IBM Dynamic Infrastructure setup. In a customer installation, there would need to be enough SAP dialog instances to support the minimum or ongoing processing requirements. Dynamic provisioning of the IBM Dynamic Infrastructure solution will then pick up when changes in processing demand occur.

3.2.5 Useful references - SAP dialog instance

We found the following publications to be useful references during this installation, configuration, and setup:

- ► *SAP R/3 Enterprise on UNIX: IBM DB2 Universal Database for z/OS and OS/390 Installation Guide*
- ► *SAP Software on UNIX: OS Dependencies,* Document Version 1.03, September 2004
- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00
- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP
- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

3.2.6 SAP IBM DI Dialog Instance Master

The SAP Dialog Instance Master runs as its own Linux on zSeries guest under z/VM.

This instance is part of the IBM DI system. It is a work in process until it is configured sufficiently to be a model template for the dynamic provisioning of additional instances. When it is built completely, it is then time to copy the system to the configuration master.

This instance has local SAP executables in the directory /sapmnt/M5D/exe, and therefore does not mount this file system from any other SAP system.

Notes:

- ► Do not mount /sapmnt/M5D/exe from any other SAP system before installing this dialog instance, or you may overwrite files on another system.
- ► IBM DI documentation requests that the SAP program SAPCE *not* be implemented, so that the provisioned clones run with a planned set of executables.

After the IBM Dynamic Infrastructure Configuration Master has been created, this system is no longer needed and can be shut down so that it is not inadvertently modified. We recommend that this system be backed up in case it needs to be restored for any reason.

3.2.7 Useful references - SAP IBM DI Dialog Instance Master

We found the following publications to be useful references during this installation, configuration, and setup:

- ► *SAP R/3 Enterprise on UNIX: IBM DB2 Universal Database for z/OS and OS/390 Installation Guide*

- *SAP Software on UNIX: OS Dependencies,* Document Version 1.03, September 2004
- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00
- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP
- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

3.2.8 SAP IBM DI Dialog Configuration Master

The SAP Dialog Configuration Master runs as its own Linux on zSeries guest under z/VM. It is built directly from the SAP IBM Dynamic Infrastructure Dialog Instance Master.

We chose to create this system through cloning of the VM minidisks, but you could also build this system manually by following the instructions provided in IBM DI documentation. Our REXX exec to link and clone the system is shown in Figure 3-3.

```
/* REXX  TO LINK AND CLONE  */
SAY 'LINKING : SAPDI TO SAPCM'
'link sapdi c01 701 RR'
'link sapdi c02 702 RR'
'link sapdi c03 703 RR'
'link sapdi c04 704 RR'
'link sapcm 1c01 801 MR'
'link sapcm 1c02 802 MR'
'link sapcm 1c03 803 MR'
'link sapcm 1c04 804 MR'
SAY 'starting copy'
'DDR IDICLN2 DDRCOPY A'
SAY 'detaching '
'det 701 '
'det 702 '
'det 703 '
'det 704 '
'det 801 '
'det 802 '
'det 803 '
'det 804 '
SAY 'done copying disks'
```

Figure 3-3   IDICLN1 EXEC A

Figure 3-4 illustrates our exec for copy.

```
SYSPRINT CONS
PROMPTS OFF
INPUT 701 DASD
OUTPUT 801 DASD
COPY ALL
INPUT 702 DASD
OUTPUT 802 DASD
COPY ALL
INPUT 703 DASD
OUTPUT 803 DASD
COPY ALL
INPUT 704 DASD
OUTPUT 804 DASD
COPY ALL
```

Figure 3-4   IDICLN2 DDRCOPY A

In our environment, the IBM DI Configuration Master Instance also provides the SAP runtime executables that are used by the dynamically provisioned servers. Since this file system existed locally before the clone from the Dialog master Instance, the files are automatically copied to this SAP system and are therefore also available locally to the dynamically provisioned servers.

> **Important:** If your environment is not set up similarly—or if it has multiple sets of cloned disks—you may find it necessary or convenient to mount this file system on each dynamically provisioned clone from the configuration master.

The IBM DI solution has requirements regarding how the VM minidisks are defined for the configuration master server, as described here:

► If the workflow defaults are used, the z/VM minidisks that are to be cloned must have DASD device addresses in the form of 1cxx in order to be recognized and copied by the IBM DI software.

► All z/VM minidisk DASD device addresses of the form 0cxx are the basis when creating the configuration master server.

► Once the configuration master server setup is complete, the content of the 0cxx minidisks must be copied to the 1cxx minidisks for cloning.

► All other DASD device addresses from 2xxx through Fxxx are not used with the defaults (but can certainly be used for custom workflows and management of multiple clone sources).

> **Note:** Additional DASD clone sets can be utilized by customizing the default DASD device addressing scheme; for more information on this subject, refer to the z/VM driver file (delivered with the Tivoli software or referenced within IBM DI documentation).

3.2.9 Useful references - SAP IBM DI Dialog Configuration Master

We found the following publications to be useful references during this installation, configuration, and setup:

► *SAP R/3 Enterprise on UNIX: IBM DB2 Universal Database for z/OS and OS/390 Installation Guide*

► *SAP Software on UNIX: OS Dependencies,* Document Version 1.03, September 2004

- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00
- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP
- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

3.3 Our management server setup

The IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite consists of several components. In this release, the product supports scenarios where the management servers run on AIX® or Windows 2000, and the provisioned servers are either SAP application servers running on AIX or SAP application servers running on Linux for zSeries.

Depending on your IT infrastructure and your requirements, you may choose one of the three topologies described in *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Guide*.

For our sample environment we chose to use topology 3, where the management system runs on two separate Windows 2003 boxes and the provisioned SAP application servers run on a Linux for zSeries z/VM guest.

Useful references - management server setup

We found the following publications to be useful references during this installation, configuration, and setup:

- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00
- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP
- *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

3.3.1 Installation order overview

We found that the order of installation was of paramount importance. The following list will guide you in the order of installation tasks for the management servers.

1. **TPMSRV:** Ensure that Java 1.4.2 is installed.
2. **TPMSRV:** Install Cygwin.
3. **TPMSRV:** WebSphere Application Server v5.1 (do *not* put spaces in the directory file names).
4. **TPMSRV:** WebSphere Application Server fix pack 1, which will bring your WebSphere Application Server to version 5.1.1. It can be downloaded from:

   http://www-1.ibm.com/support/docview.wss?rs=180&context=SSEQTP&uid=swg24007195
5. **TPMSRV:** After applying these WebSphere fixes, you must also apply fix PQ93388, which can be downloaded from:

   http://www.ibm.com/support/docview.wss?rs=0&uid=swg24007848
6. **TPMSRV:** MQ Patch IC38409.
7. **TPMSRV:** DB2 v8.1 Administration Client.

8. **TPMSRV:** DB2 v8.1 Administration Client fix pack.

9. **DB2SRV:** DB2 UDB v8.1.

10. **DB2SRV:** DB2 UDBv8.1 fix pack 3.

11. **DB2SRV:** Tivoli Directory Services v5.2.

12. **DB2SRV:** Tivoli Directory Services v5.2 fix pack 2.

13. **DB2SRV:** Replace the v3.ibm.at file with the newest version (found on product CD 6).

14. **PMSRV:** IBM Tivoli Intelligent Orchestrator v2.1.

15. **TTPMSRV:** Java Connector (JCo) v2.0.10.

16. **TPMSRV:** IBM Dynamic Infrastructure for mySAP Business Suite Release 1.

3.3.2 Database and LDAP server on DB2SRV

In the following sections, we examine this setup in more detail.

Database DB2 UDB 8.1 and DB2 Administration Client 8.1

The DB2 database on server DB2SRV provides database services for the Tivoli Directory Server (LDAP) that is used for user authentication within the IBM DI and for the Tivoli Provisioning Manager on server TPMSRV to store the data center model (DCM), Utility Business Services (UBS), Metric Services (MS), and SAP Optimizer data. Our setup is illustrated in Figure 3-5.
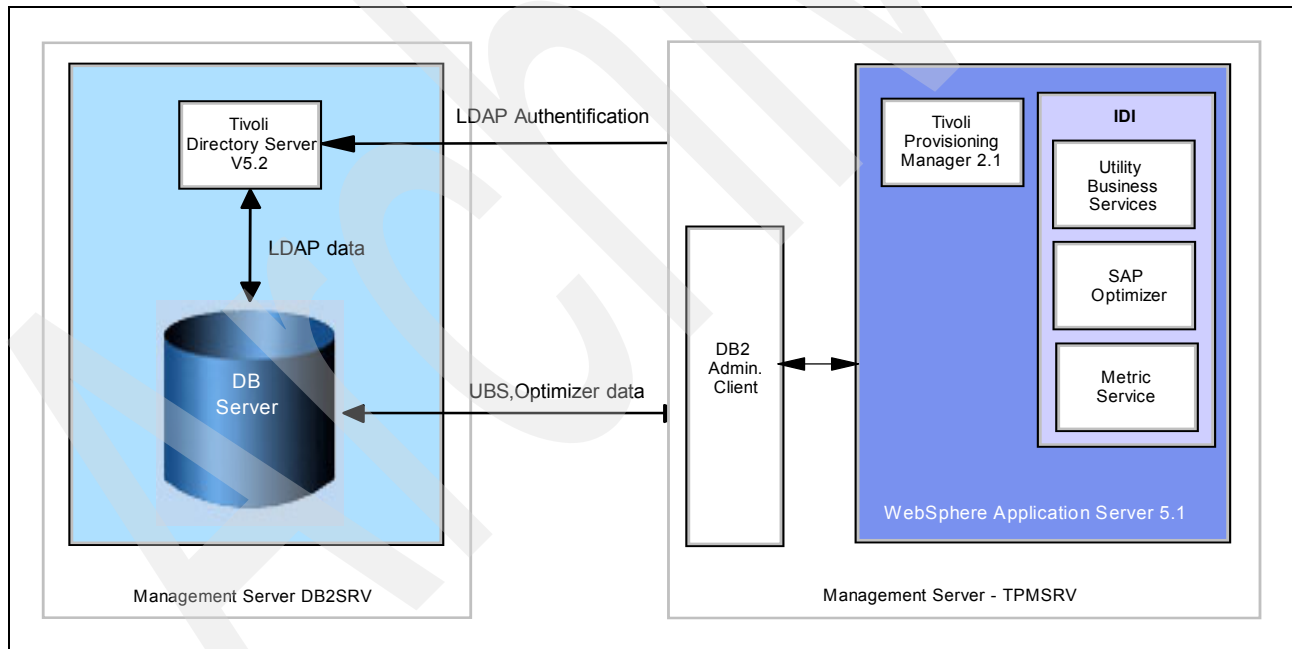
Figure 3-5   Management server database setup

We installed DB2 V8.1 UDB on DB2SRV using the standard DB2 installer. We chose to keep the default installation parameters. After the installation process, we applied the recommended fix packs and continued with the installation of the DB2 Administration Client on server TPMSRV.

IBM Tivoli Directory Server 5.2

Tivoli Directory Server (TDS) was installed using the Standard Software Installer. For further information, refer to the TDS installation guide that comes with the product.

> **Important:** Make sure you install the Directory Server fix mentioned in Chapter 8 of the *Tivoli Provisioning Manager Installation Guide for Windows*. The file v3.ibm.at provided by this fix contains important schema definitions that are needed by the Tivoli Directory Server in order to work correctly with the Tivoli Provisioning Manager.

After the installation was successful, we configured the Tivoli Directory Server to use the previously installed DB2 UDB 8.1 database. Referring to Chapter 9 of *Tivoli Directory Server Installation Guide for Windows*, we started the Tivoli Directory Server Configuration Tool to attach the DB2 UDB database to the LDAP server.

1. We entered the following data in the first panel:

   Administrator DN/passwords: `cn=root`

2. We entered an appropriate password and continued to the panel entitled Configure database. Here we chose to create a new database with the following parameters:

   UserID/Password: `ldapuser/ldapuser`

   > **Note:** Ensure that the user id you want to enter already exists as a Windows user account.
   >
   > If it does not already exist, logon as Administrator and create it before entering userid and password information.

3. Additional parameters we configured were:

   database name: `TDSDB`

   database location: `c:`

   type of database: `UTF-8`

After verification and completion, the Tivoli Directory Server Configuration Tool displays a window illustrated by Figure 3-6 on page 20.
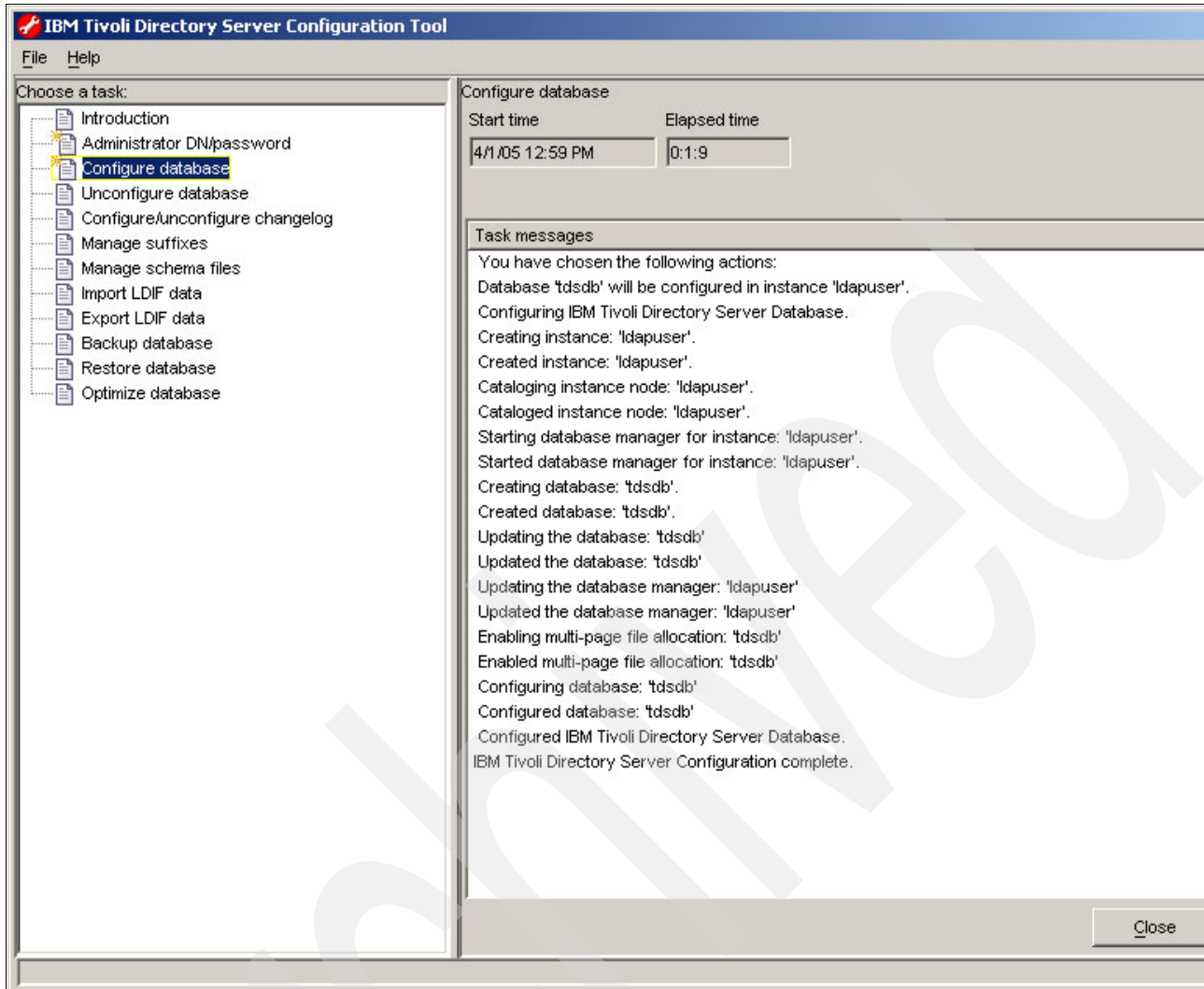
Figure 3-6   Tivoli Directory Server database configuration

You can verify the correct creation of the database by using the DB2 Control Center application. Figure 3-7 on page 21 is an example of the DB2 Control Center showing the newly created instance ldapuser and the database TDSDB.
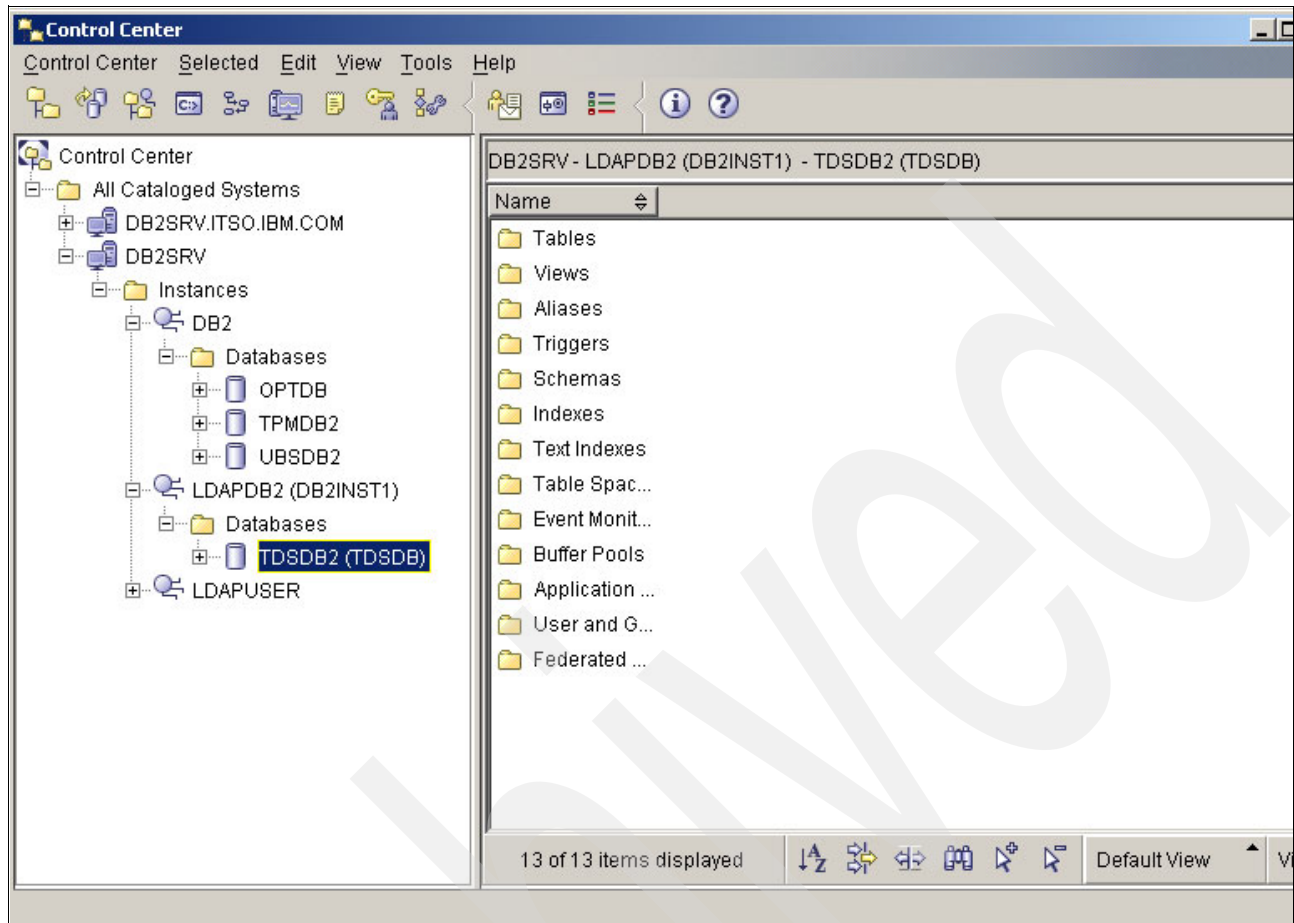
Figure 3-7   DB2 Control Center

After successful verification of the installation of the Tivoli Directory Server, we proceeded with the setup of the server TPMSRV that hosts the Tivoli Provisioning Manager (TPM), IBM WebSphere Application Server, and IBM DI.

Useful references - IBM Tivoli Directory Server 5.2

We found the following publications to be useful references during this installation, configuration, and setup:

► *IBM Tivoli Directory Server Installation and Configuration Guide Version 5.2*

► *IBM Tivoli Directory Server Administration Guide Version 5.2*

3.3.3 IBM DI components on server TPMSRV

> **Note:** In this document, we recommend using the Tivoli Provisioning Manager, which is part of the IBM Virtualization Engine (VE) that comes with the IBM DI package, to provide workflow engine functionality.
>
> Although the customer is likely to receive TPM, the same preparations and installation steps apply to the workflow component of the Tivoli Intelligent Orchestrator.

Cygwin 1.5.14-1

We used the Standard Installer that comes with Cygwin. For further information regarding Cygwin, visit:

```
http://www.cygwin.com
```

> **Important:** Not all FTP sites carry all of the necessary packages in their Cygwin installation. Ensure that your Cygwin installation includes OpenSSH and OpenSSL from the Net Cygwin package, and Regex from the Libs Cygwin package. Otherwise, many of the installation scripts will fail.
>
> Also, ensure that you are installing packages by clicking the plus (+) sign and expanding each tree.

SAP Java Connector (JCo)

The SAP Java Connector is a collection of Java classes and system-dependent runtime libraries that provide RFC functionality for Java applications.

JCo is available from the SAP Service Marketplace. From the main menu, select **Software download** → **Search for all categories**. Then type `JCO` and select **Search**. You can choose the appropriate code in the list that appears.

The SAP Java Connector can be obtained from:

```
http://service.sap.com/connectors
```

IBM WebSphere Application Server 5.1

> **Attention:** Do *not* install IBM WebSphere Application Server into directories that have spaces in the directory name, or you will not be able to install TPM or IBM DI on this machine.

We did a "Standard Install" and used the default parameters; this allows you to simply follow the instructions displayed by the installer. After that, we applied all recommended fix packs to the IBM WebSphere Application Server Installation. For further information regarding the Installation of the IBM WebSphere Application Server, refer to IBM WebSphere Application Server documentation.

IBM Tivoli Provisioning Manager 2.1

In order to install the IBM Tivoli Provisioning Manager (TPM), you need to perform some preparation and verification tasks.

> **Note:** Ensure that you have created a userid in Windows that will own the database instance you will create in the next step.

1. On DB2SRV, create a new database instance that will be used by TPM to store its Data Center Model (DCM) data.

2. Open the DB2 Command Line Processor and enter the following commands:

```
catalog tcpip node tpmdb2 remote db2srv server 50000
```

We used the name TPMDB2 for our database, although you may choose another. After the command successfully completes, you should see messages like the following:

```
DB20000I The CATALOG TCPIP NODE command completed successfully.

DB21056W Directory changes may not be effective until the directory cache is
refreshed.
```

3. To verify that server TPMSRV is able to connect the newly created instance, we logged on to TPMSRV, opened the DB2 Command Line Processor, and entered the following commands:

```
attach to tpmdb2 user tpmdb2 using tpmdb2
```

The following message indicated that the attachment was successful:

```
Instance Attachment Information
Instance server = DB2/NT 8.1.3
Authorization ID =TPMDB2
Local instance alias = TPMDB2
```

Now we were ready to proceed with the installation of the Tivoli Provisioning Manager.

We started the graphical Installer and followed the instructions on the screen. During the installation, we had to provide some parameters retrieved from the previous installation steps.
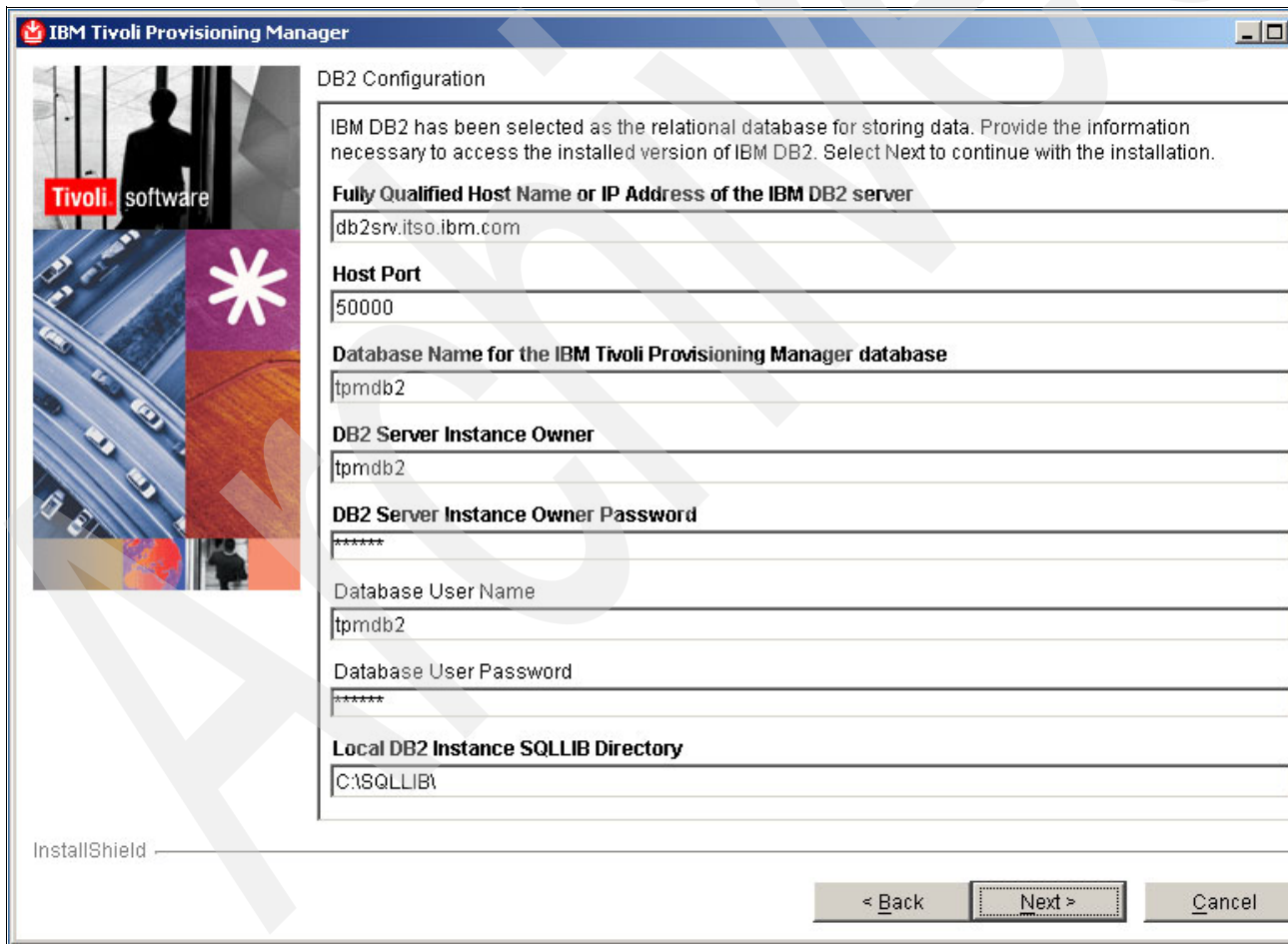
Figure 3-8   TPM Installer - configuration panel for DB2

As shown in Figure 3-8, we entered the configuration parameters of the DB2 database instance we had created in the prior steps.

On the LDAP configuration panel, we filled in the configuration data used for installing the IBM Tivoli Directory Server.

Table 3-5   TPM Installer - LDAP server configuration panel

As seen in Figure 3-5, we provided the following data:

Base DN: `dc=ibm,dc=com`

LDAP Administrator User Name: `cn=root`

LDAP Administrator User Password: `tdsuser`

Fully Qualified Host Name or IP Address: `db2srv.itso.ibm.com`

Host Port: `389` (default)

LDAP Client Installation Directory: `c:\IBM\LDAP`

Then we pressed Next and proceeded to the IBM WebSphere Application Server configuration. There we provided the installation path and the DNS suffix name of our WebSphere Application Server installation; see Figure 3-9 on page 25.
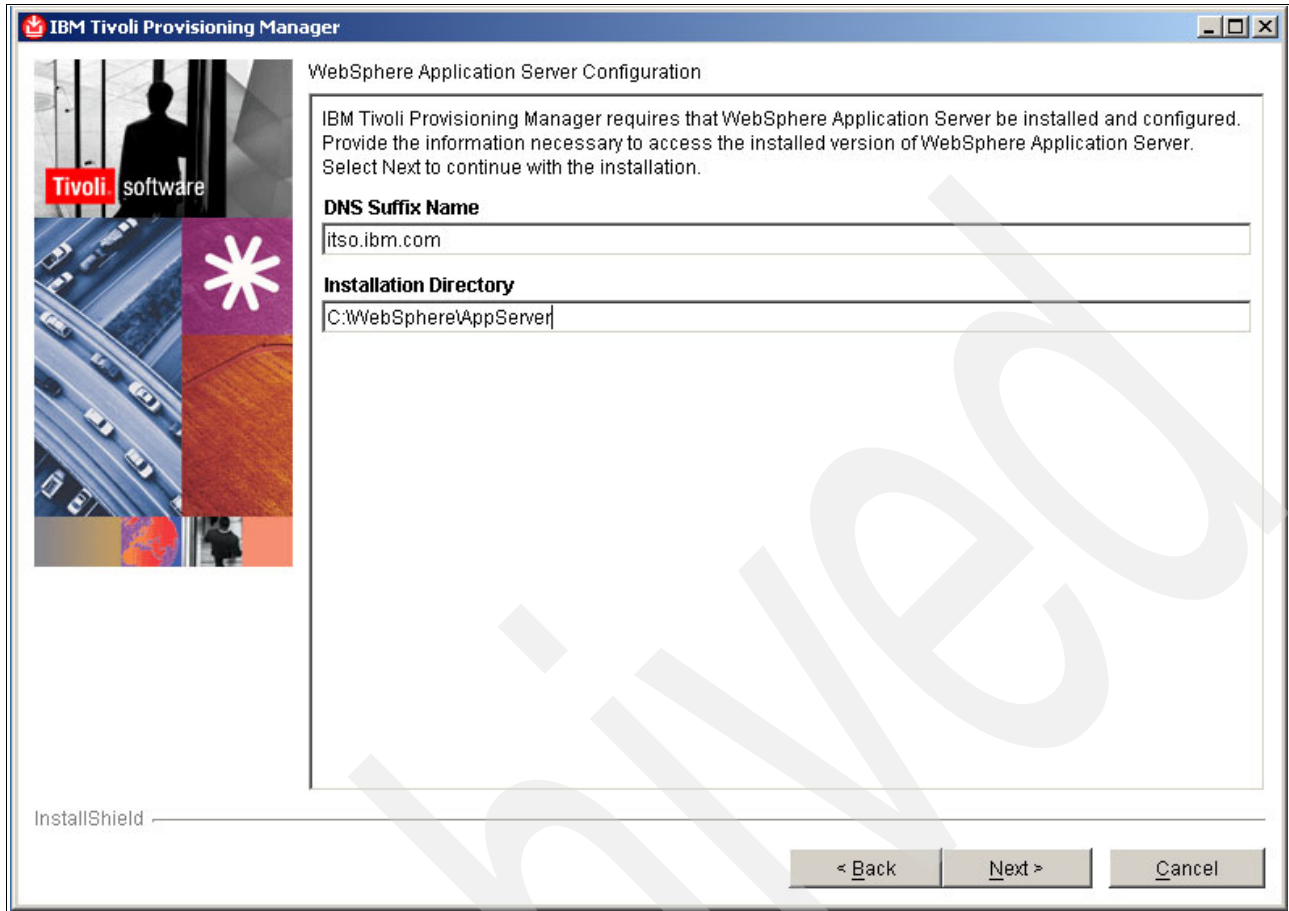
Figure 3-9   TPM Installer - IBM WebSphere Application Server configuration panel

The TPM Installer displays a confirmation window where you can verify the information entered. Then we pressed Next and started the installation process; see Figure 3-10 on page 26.
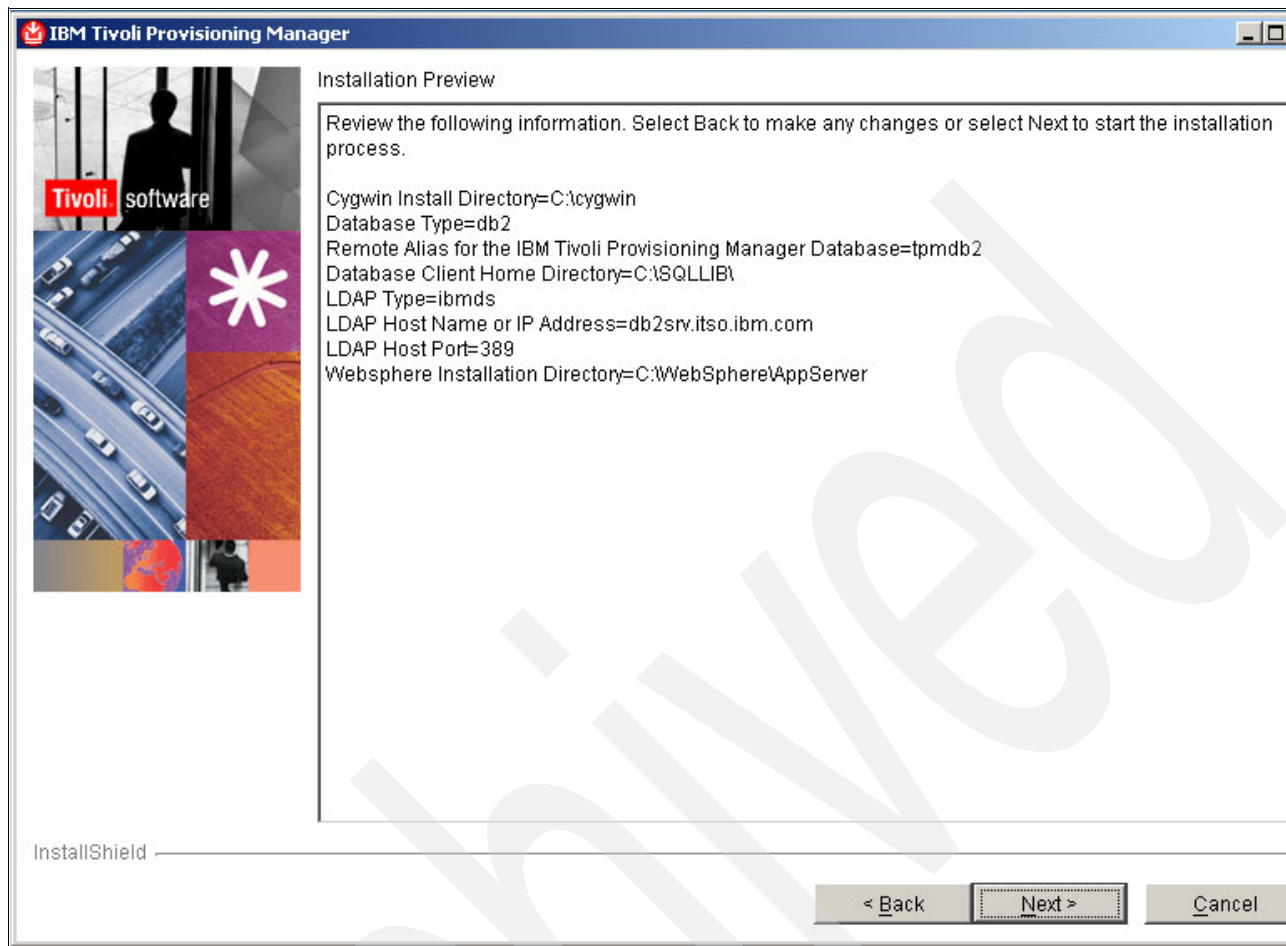
Figure 3-10   TPM Installer confirmation window

We modified the file %TIO_HOME%\xml\datacentermodel.xml according to the guidelines in *Tivoli Provisioning Manager Installation Guide for Windows- Version 2.1*. After the installation completed, we verified that all LDAP user and group definitions needed by TPM were correctly created by the installer by listing them.

> **Important:** Without the proper LDAP user and group definitions stored in the IBM Tivoli Directory Server, you will not be able to log on and use the IBM Tivoli Provisioning Manager.

To list all users and groups currently installed on our LDAP server, we logged on to DB2SRV, opened a DOS shell command window, and typed in the following command:

```
C:\IBM\ldap\bin>ldapsearch -b dc=ibm,dc=com "cn=*"
```

After the command completes successfully, a list similar to Example 3-1 is displayed:

Example 3-1   List of LDAP groups and users available after installation

```
dn: cn=wasadmin,DC=IBM,DC=COM
mail: wasadmin@thinkdynamics.com
ou: 1040
fn: testtest
businesstelephonenumber: (416) 932-6296
```

```
pwdMustChange: false
objectclass: thinkControlUser
objectclass: organizationalPerson
objectclass: person
objectclass: top
sn: TD Test User
cn: wasadmin

dn: cn=tioldap,DC=IBM,DC=COM
mail: tioldap@thinkdynamics.com
ou: 1040
fn: tioldap
pwdMustChange: false
businesstelephonenumber: (416) 932-6296
objectclass: thinkControlUser
objectclass: organizationalPerson
objectclass: person
objectclass: top
sn: tioldap
cn: tioldap

dn: cn=TCsubsystem,DC=IBM,DC=COM
objectclass: groupOfNames
objectclass: top
cn: TCsubsystem
member: cn=tiointernal,DC=IBM,dc=com

dn: cn=TCAdmin,dc=ibm,dc=com
objectclass: groupOfNames
objectclass: top
cn: TCAdmin
member: cn=tiointernal,DC=IBM,dc=com
member: cn=tioappadmin,DC=IBM,dc=com

dn: cn=TCOperatingModeController,dc=ibm,dc=com
objectclass: groupOfNames
objectclass: top
cn: TCOperatingModeController
member: cn=tiointernal,DC=IBM,dc=com
member: cn=tioappadmin,DC=IBM,dc=com

dn: cn=TCdcmOperator,dc=ibm,dc=com
objectclass: groupOfNames
objectclass: top
cn: TCdcmOperator
member: cn=tiointernal,DC=IBM,dc=com
member: cn=tioappadmin,DC=IBM,dc=com


dn: cn=TCClusterAndPoolManager,dc=ibm,dc=com
objectclass: groupOfNames
objectclass: top
cn: TCClusterAndPoolManager
member: cn=tiointernal,DC=IBM,dc=com
member: cn=tioappadmin,DC=IBM,dc=com
```

```
dn: cn=TCMonitorAndAdvisor,dc=ibm,dc=com
objectclass: groupOfNames
objectclass: top
cn: TCMonitorAndAdvisor
member: cn=tiointernal,DC=IBM,dc=com
member: cn=tioappadmin,DC=IBM,dc=com

dn: cn=tiointernal,DC=IBM,DC=COM
roleA: TCsubsystem
roleA: TCAdmin
mail: virtuoso_internal_user@ca.ibm.com
ibm-allGroups: cn=TCsubsystem
ibm-allGroups: cn=TCAdmin
fn: tiointernal
pwdMustChange: false
objectClass: thinkControlUser
objectClass: organizationalPerson
objectClass: person
objectClass: top
sn: tiointernal
cn: tiointernal

dn: cn=tioappadmin,DC=IBM,DC=COM
sn: tioappadmin
roleA: TCAdmin
businessTelephoneNumber: (905) 123-4567
mail: virtuoso_unittest_user@ca.ibm.com
objectClass: thinkControlUser
objectClass: organizationalPerson
objectClass: person
objectClass: top
ibm-allGroups: cn=TCAdmin
postalAddress: 8200 Warden
pwdMustChange: false
fn: tioappadmin
cn: tioappadmin
```

Note: Check the correct installation of TPM by issuing a workflow (for example, ping) manually.

Useful references - IBM Tivoli Provisioning Manager 2.1

We found helpful information for installation of TPM in both the TIO and TPM installation guides:

- ► *Tivoli Intelligent ThinkDynamic Orchestrator Installation Guide for Windows Version 2.1*

- ► *Tivoli Provisioning Manager Installation Guide for Windows Version 2.1*

- ► "IBM Tivoli Intelligent Orchestrator 2.1 Single Server Windows 2000 Installation Scenario" extract from IBM Tivoli World Wide Education Workshop: IBM Tivoli Intelligent Orchestrator 2.1 Planning and Implementation

- ► z/VM driver for Tivoli Provisioning Manager Readme Version 2.1.3

IBM Dynamic Infrastructure for mySAP Business Suite

The previous TPM installation created all LDAP users and groups needed in order for TPM to work properly. Now we had to add four new user groups needed by the IBM DI GUI to assign user rights.

However, we first created six additional TPM users that later would become members of those four new groups; see Figure 3-11.
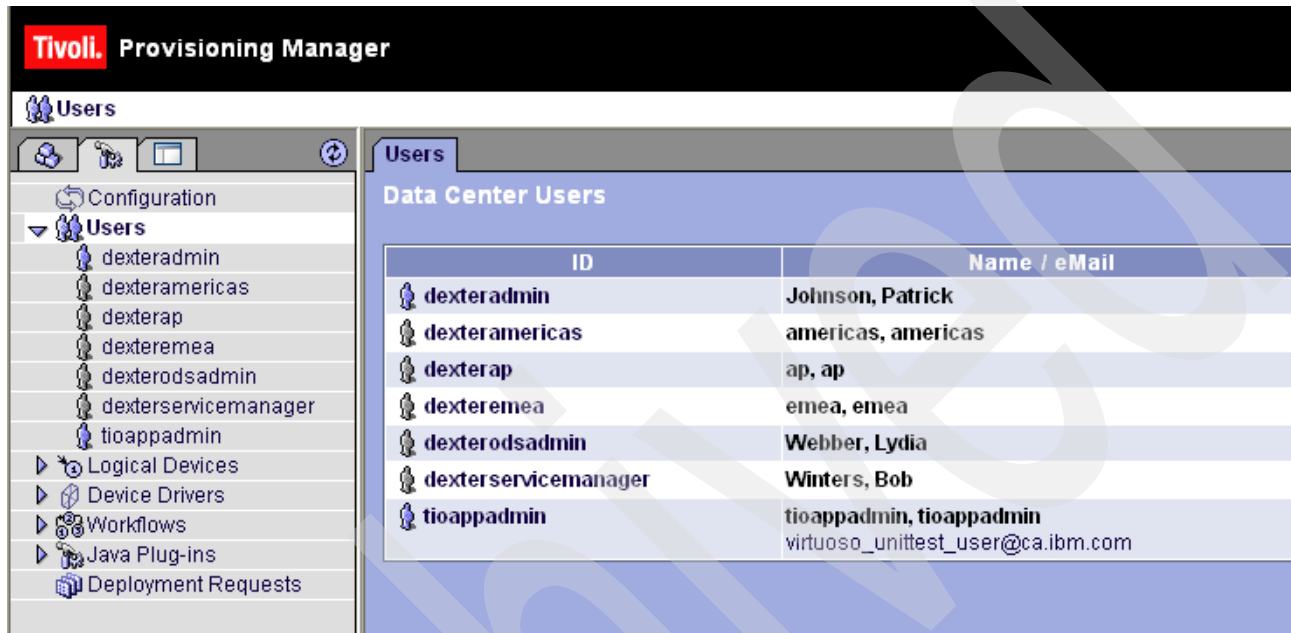
Figure 3-11   TPM GUI with newly created IBM DI users

Use the TPM GUI as described in Chapter 10 of *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization* to create the users you want for your IBM DI.

For our fictitious company, Dexter Petrol Company, we created the following users in TPM:

► `dexteradmin`
► `dexterservicemanager`
► `dexterodsadmin`

Corresponding to the several departments of Dexter Petrol Company, we added:

► `dexteremea`
► `dexterap`
► `dexteramericas`

The correct creation of the users in the LDAP database can be verified by logging in to DB2SRV and issuing the following command on a DOS shell:

```
ldapsearch -b dc=ibm,dc=com "cn=*"
```

This should display entries in the list corresponding to the users created previously. In our case, the following entries shown in Example 3-2 on page 30 were added to the list of the LDAP users.

Example 3-2   Newly created LDAP entries for use by the IBM DI GUI

```
cn=dexterservicemanager,dc=ibm,dc=com
objectClass=thinkControlUser
objectClass=organizationalPerson
objectClass=person
objectClass=top
pwdMustChange=true
fn=Bob
sn=Winters
cn=dexterservicemanager

cn=dexteradmin,dc=ibm,dc=com
objectClass=thinkControlUser
objectClass=organizationalPerson
objectClass=person
objectClass=top
cn=dexteradmin
fn=Patrick
ibm-allgroups=cn=TCAdmin
pwdmustchange=false
rolea=TCAdmin
sn=Johnson

cn=dexterodsadmin,dc=ibm,dc=com
objectClass=thinkControlUser
objectClass=organizationalPerson
objectClass=person
objectClass=top
pwdMustChange=true
fn=Lydia
sn=Webber
cn=dexterodsadmin

cn=dexteremea,dc=ibm,dc=com
objectClass=thinkControlUser
objectClass=organizationalPerson
objectClass=person
objectClass=top
pwdMustChange=true
fn=emea
sn=emea
cn=dexteremea

cn=dexterap,dc=ibm,dc=com
objectClass=thinkControlUser
objectClass=organizationalPerson
objectClass=person
objectClass=top
pwdMustChange=true
fn=ap
sn=ap
cn=dexterap

cn=dexteramericas,dc=ibm,dc=com
objectClass=thinkControlUser
```

```
objectClass=organizationalPerson
objectClass=person
objectClass=top
pwdMustChange=true
fn=americas
sn=americas
cn=dexteramericas
```

Next, we created the four new groups needed by IBM DI:

► OfferingProviderAdministrator
► OfferingServiceManager
► ODSProviderAdministrator
► OfferingSubscriber

The groups represent the user roles used by IBM DI to manage access rights on the graphical user interface. For further information, refer to *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operations and Administration*.

To create the groups needed by IBM DI you can either create an LDIF file containing the group definitions and provide the IBM DI Installer with the location of that file, or you can skip that step and import the group definitions after the installation by using the Tivoli Directory Server Configuration Tool or Tivoli Directory Server command line.

Regardless of which way you choose, you have to set up an LDIF file that contains the group definitions shown in Example 3-3.

Example 3-3   LDIF file contained group definitions for the IBM DI GUI

```
dn: cn=OfferingProviderAdministrator,dc=ibm,dc=com
cn: OfferingProviderAdministrator
objectClass: groupOfUniqueNames
description: Offering Provider Administrator
uniquemember: cn=dexteradmin,dc=ibm,dc=com

dn: cn=OfferingServiceManager,dc=ibm,dc=com
cn: OfferingServiceManager
objectClass: groupOfUniqueNames
description: Offering Service Manager
uniquemember: cn=dexterservicemanager,dc=ibm,dc=com

dn: cn=ODSProviderAdministrator,dc=ibm,dc=com
cn: ODSProviderAdministrator
objectClass: groupOfUniqueNames
description: e-Utility Provider Administrator
uniquemember: cn=dexterodsadmin,dc=ibm,dc=com

dn: cn=OfferingSubscriber,dc=ibm,dc=com
cn: OfferingSubscriber
objectClass: groupOfUniqueNames
description: Offering Subscriber
uniquemember: cn=dexteremea,dc=ibm,dc=com
uniquemember: cn=dexterap,dc=ibm,dc=com
uniquemember: cn=dexteramericas,dc=ibm,dc=com
```

As you can see in Figure 3-3 on page 31 we added our previously created users `dexteradmin`, `dexterservicemanager`, `dexterodsadmin`, `dexteremea`, `dexterap` and `dexteramericas` to the appropriate groups. For further information, refer to Chapter 10 of *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization*.

After preparing the LDIF file, we proceeded with the installation of the IBM Dynamic Infrastructure. We started the Standard Installer and followed the instructions on the screen. For further information, refer to *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization*.

During the installation, we had to enter information regarding our WebSphere Application Server installation and DB2 UDB database installation. See "IBM WebSphere Application Server 5.1" on page 22 and "IBM Tivoli Provisioning Manager 2.1" on page 22 for further information. To see the DB2 information that we entered, refer to "Database DB2 UDB 8.1 and DB2 Administration Client 8.1" on page 18.

When the LDAP configuration screen is displayed, you can either choose **LDAP Configuration** or **Skip LDAP Configuration**. If you choose LDAP Configuration, you must provide the location of the LDIF file that you created on the next panel (and as demonstrated in Example 3-3 on page 31.

We chose to import our LDIF file after the installation. To do so, you can either use the IBM Tivoli Directory Server Configuration Tool or issue the `ldapmodify` command from a DOS command line.

After the installation finished successfully, we issued the following command on a DOS shell to import the LDIF file described in Example 3-3 on page 31:

```
ldapmodify -i your_config_file.ldif -h db2srv -w tdsuser -D "cn=root"
```

The following message indicates a successful import of the LDIF data:

```
modifying entry cn=OfferingProviderAdministrator,dc=ibm,dc=com

modifying entry cn=OfferingServiceManager,dc=ibm,dc=com

modifying entry cn=ODSProviderAdministrator,dc=ibm,dc=com

modifying entry cn=OfferingSubscriber,dc=ibm,dc=com
```

To verify the successful import of the group definitions contained in the LDIF file, issue the `ldapsearch` command again:

```
ldapsearch -b dc=ibm,dc=com "cn=*"
```

A list is displayed of all users and group definitions as shown in Example 3-1 on page 26, but having the additional group definitions from the LDIF file.

At this point, IBM DI can be started by using the provided start script `tio_start.bat` located in %TIO_HOME%\tools\.

> **Important:** You may want to edit the tio_start.bat and tio_stop.bat scripts to ensure that they conform to your installation locations.

Starting IBM DI

Open your Web browser and enter the URL of your IBM DI user interface (in our case, `http://tpmsrv.itso.ibm.com:9080/euiSapGuiWeb/login.jsp`). You will be presented with a screen similar to Figure 3-12.
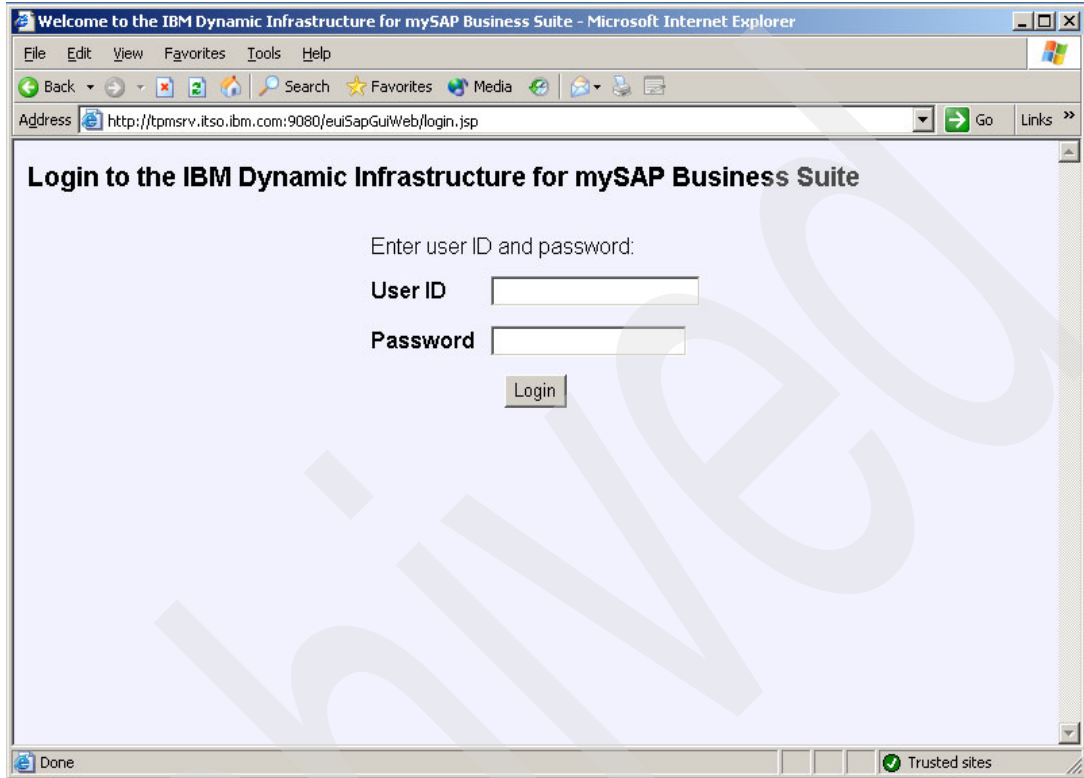
Figure 3-12   IBM Dynamic Infrastructure for mySAP Business Suite Login screen

Enter one of the user ids and passwords you have created in the preceding steps, preferably the one with administrator permissions (in our case, dexteradmin). See Figure 5-5 on page 77 for a summary of IBM DI actions and which users and roles can perform those actions.
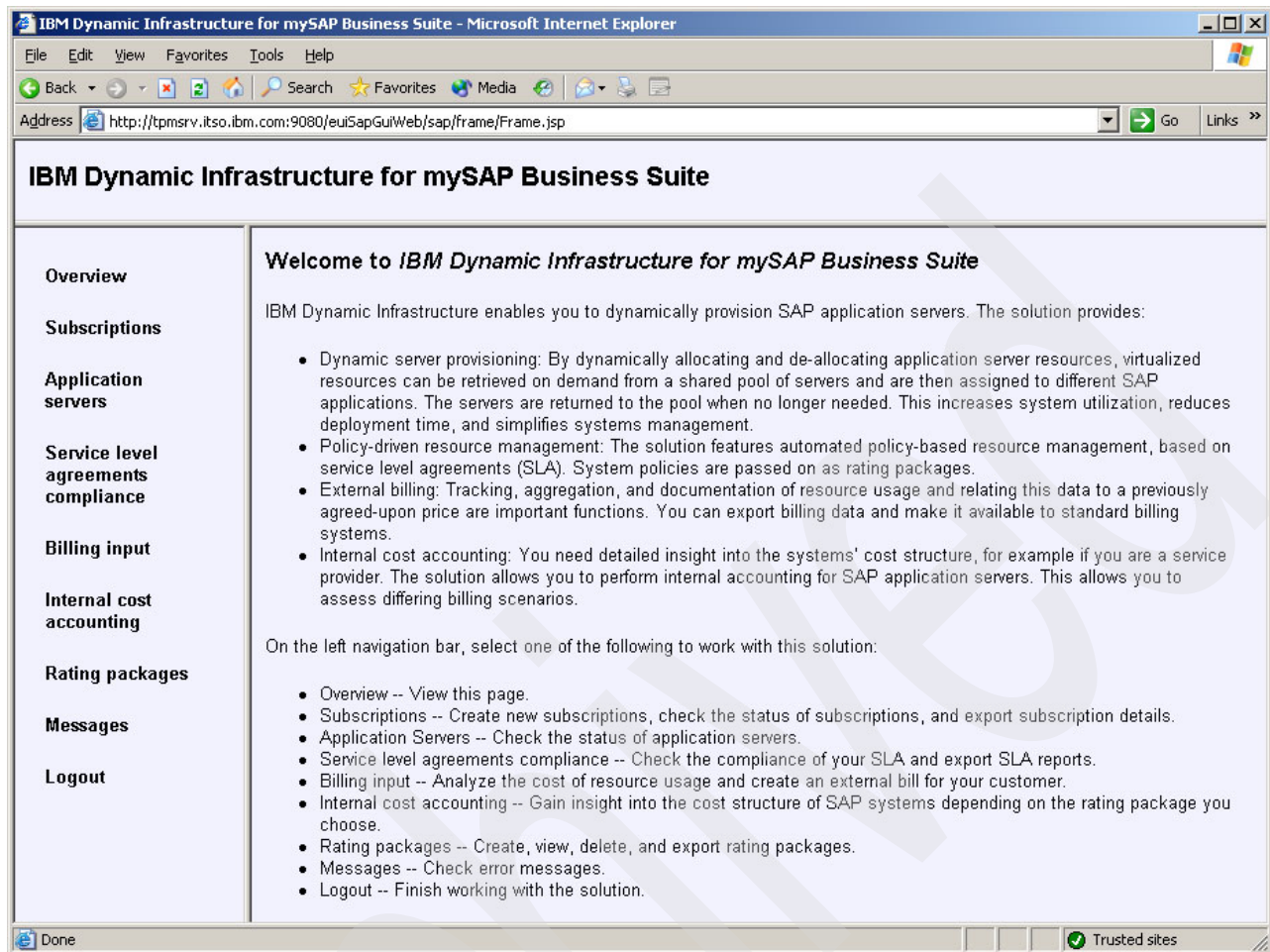
Figure 3-13   IBM Dynamic Infrastructure for mySAP Business Suite main screen

After successful installation of the IBM DI package, you will have to customize the XML file that describes the hardware assets that are available in your target system. All information you provide in these XML files is used to customize the Data Center Model that TPM uses to manage your resources.

These XML files are located in %TIO_HOME%\xml. Before you start, collect the information necessary to customize the file. For our installation, we used sample_zVM_zLinux_zDB2.xml as a template.

Data Center Model (DCM)

The Data Center Model is a description of all logical and physical resources that are managed by TPM. *Managed resources* could be servers, switches, load balancers, software and other related equipment. The DCM keeps track of changes made by workflows to the hardware and software configuration, and keeps the model in sync with the real world hardware and software assets that are associated with it. The DCM also stores information needed for the management of resource pools and clusters such as server ids, size of resource pools, number of active and inactive servers and server priorities.

The DCM information is stored in a central database controlled by IBM Tivoli Provisioning Manager. The DCM contains information regarding a real life data center. Tivoli Provisioning Manager communicates directly with all components of the data center, based on the definitions in the DCM.

DCM entries can be built using an XML file and imported into the DCM database. To customize the DCM XML file, we have to provide the following solution-specific information:

- ► Switch fabric
- ► VLANs and subnets
- ► Boot server
- ► Software Product
- ► Software Stack
- ► Service Access Points
- ► The TPM Server itself
- ► Resource Pool and Servers
- ► Customers, Applications, and Clusters

The following sections provide details of the DCM definitions used during the development of this redbook.

Switch fabric

The Switch fabric is used to create a logical hierarchy of resources in the DCM. Example 3-4 shows the definition used in this redbook (to see the complete DCM XML file, refer to Appendix B, "Sample DCM XML file" on page 93).

Example 3-4   Switch fabric

```
<!-- SWITCH FABRIC -->
<switch-fabric name="ITSO_zVM_Fabric"/>
```

VLANs and subnets

Define here the subnetworks you are using in your setup. You may obtain this information from your LAN administrator.

Example 3-5   VLANs and subnets

```
<subnetwork ipaddress="9.12.4.0" netmask="255.255.254.0">
     <!-- zVM admin VLAN zVM system 1 -->
     <vlan vlan-number="110" fabric="ITSO_zVM_Fabric"/>
   </subnetwork>
```

Boot server

This part of the XML file describes the parameters needed to access the resources of a zSeries Z/VM system. `ZVM Disk Pool Name` is a name for a set of minidisks used for the cloning process. The `ZVM System` parameter defines the IP address of the z/VM system that receives commands from the Tivoli Provisioning Manager; see Example 3-6.

Password credentials needed for the login into the z/VM are provided by the parameters `<credentials search-key="zVM login" is-default="true">` and `<credentials search-key="zVM initial" is-default="false">`.

Example 3-6   zVM Boot server

```
<boot-server name="zVM Boot Server" is-device-model="zVM Boot Server" locale="en_US">
     <property name="ZVM Disk Pool Name" value="saplf1"/>
     <property name="ZVM System" value="9.12.4.129"/>
     <sap name="zVM vmapi" port="0" host="false" is-device-model="zVM Vmapi Service Access
Point" protocol-type="other" app-protocol="LOCAL-EXEC" other-type-description="execute
vmapi local command" locale="en_US">
        <default-sap operation-type="execute-command"/>
        <credentials search-key="zVM login" is-default="true">
          <password-credentials username="idadm" password="newpw"/>
```

```
        </credentials>
        <credentials search-key="zVM initial" is-default="false">
          <password-credentials username="idadm" password="newpw"/>
        </credentials>
      </sap>
</boot-server>
```

Software Product

This definition is used to reference an operating system to be installed on the provisioned servers; see Example 3-7.

Example 3-7   Software Product

```
<software name="zVM SuSE SLES Operating System" is-device-model="zVM SuSE Operating System"
version="1.0" type="OPERATING_SYSTEM" package_path="" locale="en_US">
        <property name="ZVM PingTimeoutInSeconds" component="DEPLOYMENT_ENGINE"
value="3600"/>
</software>
```

Software Stack

This represents the Linux on zSeries master installation to be used during the provisioning operation. The software stack definition has Boot server dependencies.

There are four variables defined by the property tag in the XML definition required for IDI:

ZVM Prototype	Contains the Prototype definition name as defined in z/VM
ZVM Master Image	Contains the user ID in z/VM of the configuration master server and the set of minidisks to be used during the cloning operation (1cxx, in our case)
ZVM CloneOperationTimeoutInSeconds	The overall time required to execute the clone image operation
ZVM VmapiOperationTimeoutInSeconds	The overall time required to execute the vmapi operation within the image install workflows.

Example 3-8   Software Stack

```
<software-stack name="zVM SW Stack OS SuSE" is-device-model="zVM Image Software Stack"
is-image="true" boot-server="zVM Boot Server" locale="en_US">
     <software-stack-product product-name="zVM SuSE SLES Operating System" position="1"
expected-state="running"/>
     <property name="ZVM Prototype" component="DEPLOYMENT_ENGINE" value="LINUXVM"/>
     <property name="ZVM Master Image" component="DEPLOYMENT_ENGINE" value="sapcm 1"/>
       <property name="ZVM CloneOperationTimeoutInSeconds" component="DEPLOYMENT_ENGINE"
value="18000"/>
       <property name="ZVM VmapiOperationTimeoutInSeconds" component="DEPLOYMENT_ENGINE"
value="3600"/>
     <property name="destinationDeviceModel" component="DEPLOYMENT_ENGINE" value="zVM SuSE
Operating System"/>
     <sap name="zVM ssh" port="22" host="true" is-device-model="zVM SSH Service Access
Point" protocol-type="ipv4" app-protocol="SSH" auth-compulsory="false" locale="en_US">
        <default-sap operation-type="execute-command"/>
        <credentials search-key="zVM ssh sap" is-default="true">
           <rsa-credentials username="root"/>
        </credentials>
     </sap>
```

```
            <sap name="zVM scp" port="22" host="true" protocol-type="ipv4" app-protocol="SCP"
auth-compulsory="false" locale="en_US">
              <default-sap operation-type="file-transfer"/>
              <credentials search-key="scp" is-default="true">
                  <rsa-credentials username="root"/>
              </credentials>
        </sap>
          <sap name="zVM ping" port="0" host="true" protocol-type="ipv4" app-protocol="SNMP"
auth-compulsory="false" locale="en_US">
            <default-sap operation-type="ping"/>
            <credentials search-key="default" is-default="true">
                <snmp-credentials community="public"/>
            </credentials>
        </sap>
</software-stack>
```

Service Access Points

These Service Access Point definitions are used for access authorization to the provisioned
server during the provisioning operations. For example, during the cloning operation, the
newly provisioned server reboots. The provisioning workflows execute an SNMP ping
operation to realize the server is back up and running. The SNMP ping operation will fail
without the Service Access Point definition snmp-get shown in Example 3-9.

Example 3-9   Service Access Points

```
<!ENTITY linux-saps '
    <sap name="snmp-set" port="161" is-device-model="SNMP V1 Service Access Point"
context="write" host="true" protocol-type="ipv4" app-protocol="SNMP" locale="en_US">
      <default-sap operation-type="set-attribute"/>
      <credentials search-key="primary" is-default="true">
          <snmp-credentials community="public"/>
      </credentials>
    </sap>
    <sap name="snmp-get" port="161" is-device-model="SNMP V1 Service Access Point"
context="read" host="true" protocol-type="ipv4" app-protocol="SNMP" locale="en_US">
       <default-sap operation-type="get-attribute"/>
       <credentials search-key="primary" is-default="true">
         <snmp-credentials community="public"/>
       </credentials>
     </sap>
     <sap name="ssh service" port="22" app-protocol="SSH" is-device-model="SSH Service
Access Point" host="true"  locale="en_US">
     <default-sap operation-type="execute-command"/>
     <credentials search-key="primary" is-default="true">
       <password-credentials username="root" password="itso4you"/>
     </credentials>
     </sap>
     <sap name="scp client" port="22" app-protocol="SCP"  is-device-model="SSH Service
Access Point" host="false"  locale="en_US">
       <default-sap operation-type="file-transfer"/>
       <credentials search-key="primary" is-default="true">
         <password-credentials username="root" password="itso4you"/>
       </credentials>
     </sap>
 '>
```

TPM Server

This DCM definition represents the server that is running TPM. This definition will mainly be used as an SSH client for SSH communications to other resources in the DCM; see Example 3-10.

Example 3-10   TPM server DCM entry

```
<server name="tpmsrv.itso.ibm.com" locale="en_US">
      <sap name="zVM ssh" port="0" host="false" is-device-model="zVM SSH Service Access
Point" protocol-type="ipv4" app-protocol="SSH" auth-compulsory="false">
          <default-sap operation-type="execute-command"/>
          <credentials search-key="zVM ssh sap" is-default="true">
             <rsa-credentials username="root"/>
          </credentials>
      </sap>
      <sap name="zVM scp" port="22" host="false" protocol-type="ipv4" app-protocol="SCP"
auth-compulsory="false" locale="en_US">
          <default-sap operation-type="file-transfer"/>
          <credentials search-key="scp" is-default="true">
              <rsa-credentials username="root"/>
          </credentials>
      </sap>
</server>
```

Resource Pool and Servers

The Resource Pool contains a series of predefined servers that can be dynamically allocated to applications using the application's Cluster definition; see Example 3-11. During server allocation time, a server defined in the Resource Pool is associated with a z/VM user ID (virtual machine) that will be installed the previously defined Software Stack.

There is a variable defined by the property tag in the XML definition required for IDI. The variable name must be zVM Related BootServerId and its value must contain the ID defined in TPM for the Boot Server. We defined the value of this variable as X, since the Boot server had not been defined in the DCM yet. After all the definitions were imported into the DCM, we used the TPM GUI to manually change the value of this variable with the correct Boot server ID.

Note also that the device model defined for the servers was euisap zVM Server. This device model is defined by the IBM Dynamic Infrastructure for mySAP Automation Package. Since this Automation Package is installed in IBM Tivoli Provisioning Manager during the IBM Dynamic Infrastructure for mySAP installation, ensure that the Resource Pool and Servers definitions are done after the IBM Dynamic Infrastructure for mySAP installation.

Example 3-11   Resource Pools and Servers

```
<spare-pool name="zVM Virtual Server Pool" vlan="110" os-type="linux"
fabric="ITSO_zVM_Fabric" locale="en_US">
     <!-- add servers as representation for the virtual servers capacity to the spare-pool
with name="zVM Server Pool" -->
        <server name="Server 1" is-device-model="euisap zVM Server" locale="en_US">
       <network-interface ipaddress="9.12.4.250" name="Admin" netmask="255.255.254.0"
managed="false"/>
        <nic managed="true" connected-to-switch="Prod-SW-1" connected-to-module="fa0"
connected-to-port="11"/>
           <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
         &linux-saps;
         </server>
         <server name="Server 2" is-device-model="euisap zVM Server" locale="en_US">
```

```
                <network-interface ipaddress="9.12.4.249" name="Admin" netmask="255.255.254.0"
managed="false"/>
                <nic managed="true" connected-to-switch="Prod-SW-1" connected-to-module="fa0"
connected-to-port="12"/>
                <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
           &linux-saps;
           </server>
           <server name="Server 3" is-device-model="euisap zVM Server" locale="en_US">
                <network-interface ipaddress="9.12.4.248" name="Admin" netmask="255.255.254.0"
managed="false"/>
                <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
           &linux-saps;
           </server>
           <server name="Server 4" is-device-model="euisap zVM Server" locale="en_US">
                <network-interface ipaddress="9.12.4.247" name="Admin" netmask="255.255.254.0"
managed="false"/>
                <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
           &linux-saps;
           </server>

</spare-pool>
```

Customers, Applications, and Clusters

This section describes a sample customer that uses an application defined in the DCM.

When a customer makes a subscription to an offering, the workflows triggered in TPM dynamically define DCM entries for Customer, Application, and Cluster related to the subscription. Because these operations occur automatically, there is no need to define them manually. However, it is a good idea to make the definitions for testing and troubleshooting purposes. Example 3-12 displays a sample DCM entry for Customer, Application, and Cluster.

Example 3-12   Customer, Application and Cluster sample definition

```
<!-- this is a sample customer for manual provisioning and test purposes -->
<customer name="zVM Customer">

     <application name="zVM App1" priority="1" locale="en_US">
        <service-level-objective internal="false" type="min-availability" value="0.99"/>
        <service-level-objective internal="false" type="max-response-time" value="0.167"/>
        <cluster name="zVM Cluster App1" is-device-model="zVM Cluster" min-servers="0"
max-servers="12" pool="zVM Virtual Server Pool" fabric="ITSO_zVM_Fabric" vlan="110"
software-stack="zVM SW Stack OS SuSE" locale="en_US"/>
     </application>

     <application name="zVM App2" priority="1" locale="en_US">
        <service-level-objective internal="false" type="min-availability" value="0.99"/>
        <service-level-objective internal="false" type="max-response-time" value="0.167"/>
        <cluster name="zVM Cluster App2" is-device-model="zVM Cluster" min-servers="0"
max-servers="12" pool="zVM Virtual Server Pool" fabric="ITSO_zVM_Fabric" vlan="110"
software-stack="zVM SW Stack OS SuSE" locale="en_US"/>
     </application>
     <!-- add additional application for this customer here -->

</customer>
```

Useful reference - IBM Dynamic Infrastructure for mySAP Business Suite

We found the following publications to be useful references during this installation, configuration, and setup:

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Release 1, Version 1*

► *IBM Tivoli Directory Server Administration Guide Version 5.2*

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operations*

3.4 Our z/OS system setup

The z/OS system is used to host the DB2 database server for the SAP system. Our z/OS system was a three-way LPAR on a z990 2084-318. We had 2 GB memory and an OSA-Express GbE adapter for networking. We set aside about 100 GB of disk space for the DB2 database.

3.4.1 Customizations for SAP

Since our version of SAP was 4.7, we configured a started task (STC) named ICLIM5D to serve as the Integrated Call Level Interface (ICLI) for the transfer of SQL statements from the SAP application servers to the DB2 database server.

> **Note:** The version of SAP to be used will determine whether an ICLI or Distributed Relational Database Architecture™ (DRDA®) connection via DB2 Connect™ is required.

Our SAP-specific DB2 zParms can be found in "DB2 DSNZPARMs used on DB2 subsystem DB7U" on page 86.

Useful reference - SAP customization
We found the following publication to be a useful reference during this configuration:

► *SAP on DB2 UDB for OS/390 and z/OS: Planning Guide SAP Web Application Server 6.20,* SC33-7959

3.4.2 Customizations for IBM Dynamic Infrastructure

Documentation required to set up the zSeries system to accommodate IBM Dynamic Infrastructure is provided with the z/VM automation package. The z/VM automation package is installed in the IBM Tivoli Provisioning Manager environment during the IDI Dynamic Infrastructure installation.

In the following sections, we detail the z/VM setup used during the development of this redbook.

3.5 Our z/VM system setup

Our z/VM system setup is detailed in this section.

► The system was pre-built for our use on this project, with VSMSERVE already running.We ran VM 5.1 with the maintenance listed in SAP OSS Note 81737. RACF® was not installed.

► We ran IBM Directory Maintenance (DIRM) both for CMS user administration of 191 minidisks as well as for IBM DI VM prototype entries, profile entries, and group information for managed distribution of disk drives.

► We had a total of 29 3390-3 disk drives available to our Linux on zSeries servers. We had to manually issue the VM ATTACH and VARY ONLINE commands for each disk drive to ensure they were attached and available to our system.

► Our z/VM system name was vmlinux5 and the IP address was 9.12.4.129.

► We used the MAINT userid to perform system setup and configuration.

Useful references - our z/VM system setup

We found the following documentation to contain helpful information regarding configuration and setup:

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP

3.5.1 VM customizations for IBM Dynamic Infrastructure

We defined to Directory Maintenance (DIRM) the default Linux profile used in each of the z/VM Guest user definitions. Our definitions are shown in Example 3-13.

This is where we were able to specify the default building blocks to be used by IDI workflows for the creation of the userids associated with each dynamically provisioned server.

Example 3-13   Linux default profile created in z/VM DIRM directory

```
PROFILE LINDFLT
  CLASS G
  STORAGE 256M
  MAXSTORAGE 2047M
  IPL C00
  IUCV ALLOW
  MACHINE ESA
  CONSOLE 009 3215 T
  SPOOL 000C 2540 READER *
  SPOOL 000D 2540 PUNCH A
  SPOOL 000E 1403 A
  LINK MAINT 0190 0190 RR
  LINK MAINT 019D 019D RR
  LINK MAINT 019E 019E RR
```

We created the DIRM directory prototype in Example 3-14 on page 42 to be used by the IDI workflows when defining the default A minidisk and the network interface definition. In our case, the NICDEF statement refers to the virtual network device address of C200, which can

be used by each dynamically provisioned server without parameter file modification and allows connectivity via the z/VM vswitch definition.

Example 3-14   Directory prototype entry in DIRM for IBM DI users

```
USER LINUX NOLOG
INCLUDE LINDFLT
NICDEF C200 TYPE QDIO LAN SYSTEM LAN1 MACID 010000
MDISK 191 3390 AUTOG 0010 ANY MR
```

Example 3-15 shows our definition of the administrative user ID in z/VM that will be used to when IBM Tivoli Provisioning Manager uses the VM VSM API to create new directory entries for the newly provisioned servers.

We created the IDADM guest as outlined in the IDI for mySAP Business Suite Installation and Customization. This guest is used to provide administrative services to the IBM DI workflows that are run on the Tivoli management servers.

Example 3-15   Administration user ID

```
USER IDADM XXXXXXXX
   INCLUDE IBMDFLT
   MDISK 0191 3390 1081 20 515U1R MR
*DVHOPT LNK0 LOG1 RCM1 SMS0 NPW1 LNGAMENG PWC20050413 CRCfï
```

Example 3-16 shows a sample entry created in z/VM for a new application server during the provisioning operation. This entry is created in the z/VM directory based on the Linux prototype, SAP configuration master server, and the Administration user ID definitions.

Example 3-16   User ID definition for a cloned system

```
USER IDADM002 XXXXXXXX
    INCLUDE LINDFLT
    IPL C02
    NICDEF C200 TYPE QDIO LAN SYSTEM LAN1 MACID 010002
    MDISK 0191 3390 1141 10 515U1R MR
    MDISK 0C01 3390 001 3338 DK8024 MR
    MDISK 0C02 3390 001 400 DK8025 MR
    MDISK 0C03 3390 001 3338 DK8026 MR
    MDISK 0C04 3390 001 3338 DK8027 MR
 *DVHOPT LNK0 LOG1 RCM1 SMS0 NPW1 LNGAMENG PWC20050720 CRCH6
```

Example 3-17 represents the VM System Management Server directory entry defined in our environment.

Example 3-17   VMSERVE directory definition

```
USER VSMSERVE XXXXXXXX 32M 32M ABCDEFG
    D80NECMD FAIL
    IPL CMS
    IUCV ANY MSGLIMIT 255
    MACHINE ESA
    OPTION DIAG88 MAINTCCW LNKS LNKE
    CONSOLE 0009 3215 T
    SPOOL 000C 2540 READER *
    SPOOL 000D 2540 PUNCH A
    SPOOL 000E 1403 A
    LINK MAINT 0190 0190 RR
    LINK MAINT 019D 019D RR
    LINK MAINT 019E 019E RR
```

```
LINK MAINT 0193 0193 RR
LINK MAINT OCF1 OCF1 MD
LINK MAINT OCF2 OCF2 MD
LINK TCPMAINT 0591 0591 RR
LINK TCPMAINT 0592 0592 RR
MDISK 0191 3390 1818 025 515RES MR READ WRITE MULTIPLE
```

Authorization control files for the VM SM API need to be customized to grant the administrative user (IDADM, in our case) proper authorization access. These authorization control files reside on the 191 minidisk of he VSMSERVE user ID and are named VMSERVE AUTHLIST and VSMSERVE NAMELIST. The administration user ID needs to be authorized to perform the following group of functions for all user IDs:

► QUERY_FUNCTIONS

It also needs to be authorized to perform the following group of functions for all user IDs defined to be used during the provisioning operation (IDADM00X user IDs, in our case):

► DM_CONTROL
► DM_IMAGE_CONTROL
► IMAGE_OPERATION
► IMAGE_DEVICES
► IMAGE_CONNECT

To simplify our setup we granted the userid IDADM full access, as shown in Example 3-18. This is *not* recommended for production environments.

Example 3-18   VSMSERVE AUTHLIST file

```
MAINT                                          ALL
IDADM                                          ALL
VSMSERVE                                       ALL
```

Example 3-19 shows the VSMSERVE NAMELIST used in our scenario.

Example 3-19   VSMSERVE NAMELIST file

```
:nick.SERVER_FUNCTIONS
:list.
MODIFY_SESSION_TIMEOUT_INTERVAL
MODIFY_SERVER_TIMEOUT_INTERVAL
QUERY_TIMEOUT_INTERVAL
LOGIN
LOGOUT
TRUSTED_USER
VSMAPI_DEBUG
VSMAPI_NULL
VSMSERVE_SHUTDOWN
:nick.AUTHORIZATION
:list.
AUTHORIZATION_LIST_ADD
AUTHORIZATION_LIST_REMOVE
AUTHORIZATION_LIST_QUERY
:nick.NAME_LIST
:list.
NAME_LIST_ADD
NAME_LIST_REMOVE
NAME_LIST_DESTROY
NAME_LIST_QUERY
:nick.DM_CONTROL
```

```
:list.
STATIC_IMAGE_CHANGES_ACTIVATE
STATIC_IMAGE_CHANGES_DEACTIVATE
STATIC_IMAGE_CHANGES_IMMEDIATE
DIRECTORY_MANAGER_COMMAND
QUERY_DIRECTORY_MANAGER_LEVEL
QUERY_ASYNCHRONOUS_OPERATION
:nick.DM_PROTOTYPE_MANAGEMENT
:list.
PROTOTYPE_NAME_QUERY
PROTOTYPE_CREATE
PROTOTYPE_REPLACE
PROTOTYPE_DELETE
PROTOTYPE_QUERY
:nick.DM_IMAGE_CONTROL
:list.
IMAGE_NAME_QUERY
IMAGE_CREATE
IMAGE_DELETE
IMAGE_QUERY
IMAGE_REPLACE
IMAGE_PASSWORD_SET
IMAGE_LOCK
IMAGE_UNLOCK
:nick.IMAGE_OPERATION
:list.
IMAGE_ACTIVATE
IMAGE_DEACTIVATE
IMAGE_RECYCLE
IMAGE_DEVICE_RESET
VIRTUAL_NETWORK_LAN_QUERY
IMAGE_STATUS_QUERY
:nick.IMAGE_DEVICES
:list.
IMAGE_DISK_CREATE
IMAGE_DISK_COPY
IMAGE_DISK_SHARE
IMAGE_DISK_DELETE
IMAGE_DISK_UNSHARE
IMAGE_DEVICE_DEDICATE
IMAGE_DEVICE_UNDEDICATE
:nick.IMAGE_CONNECT
:list.
VIRTUAL_NETWORK_CONNECTION_CREATE
VIRTUAL_NETWORK_CONNECTION_DELETE
VIRTUAL_NETWORK_ADAPTER_CREATE
VIRTUAL_NETWORK_ADAPTER_DELETE
VIRTUAL_NETWORK_LAN_CONNECT
VIRTUAL_NETWORK_LAN_DISCONNECT
VIRTUAL_NETWORK_VSWITCH_CONNECT
VIRTUAL_NETWORK_VSWITCH_DISCONNECT
VIRTUAL_NETWORK_VSWITCH_QUERY
VIRTUAL_NETWORK_VSWITCH_SET
:nick.SHARED_STORAGE
:list.
SHARED_STORAGE_CREATE
SHARED_STORAGE_DELETE
SHARED_STORAGE_REPLACE
SHARED_STORAGE_QUERY
SHARED_STORAGE_ACCESS_ADD
```

```
SHARED_STORAGE_ACCESS_REMOVE
SHARED_STORAGE_ACCESS_QUERY
:nick.VOLUME
:list.
IMAGE_VOLUME_ADD
IMAGE_VOLUME_DELETE
IMAGE_VOLUME_SPACE_DEFINE
IMAGE_VOLUME_SPACE_REMOVE
IMAGE_VOLUME_SPACE_QUERY
:nick.VMRM
:list.
VMRM_MEASUREMENT_QUERY
VMRM_CONFIGURATION_UPDATE
VMRM_CONFIGURATION_QUERY
:nick.QUERY_FUNCTIONS
:list.
AUTHORIZATION_LIST_QUERY
NAME_LIST_QUERY
QUERY_DIRECTORY_MANAGER_LEVEL
PROTOTYPE_QUERY
PROTOTYPE_NAME_QUERY
IMAGE_NAME_QUERY
IMAGE_QUERY
IMAGE_STATUS_QUERY
VIRTUAL_NETWORK_LAN_QUERY
VIRTUAL_NETWORK_VSWITCH_QUERY
QUERY_TIMEOUT_INTERVAL
QUERY_ASYNCHRONOUS_OPERATION
SHARED_STORAGE_QUERY
SHARED_STORAGE_ACCESS_QUERY
IMAGE_VOLUME_SPACE_QUERY
VMRM_MEASUREMENT_QUERY
VMRM_CONFIGURATION_QUERY
:nick.LNAME.DO.NOT.REMOVE
```

We also created a group allocation for definition of available DASD devices that are available to dynamically provisioned servers. The group definition is contained in the DIRM Extent Control File. It is represented by the line beginning with SAPLF1. Our configuration is shown in Example 3-20.

Example 3-20   Default Extent Control Entries to support IBM DI

```
:REGIONS.
  *RegionId  VolSer    RegStart        RegEnd  Dev-Type  Comments
515RES    515RES        001         3338 3390-03   3390 1
515W01    515W01        001         3338 3390-03   3390 1
515W02    515W02        001         3338 3390-03   3390 1
515U1R    515U1R        001         3338 3390-03   3390 1
DK8024    DK8024        001         3338 3390-03   3390 1
DK8025    DK8025        001         3338 3390-03   3390 1
DK8026    DK8026        001         3338 3390-03   3390 1
DK8027    DK8027        001         3338 3390-03   3390 1
:END.
:GROUPS.
  *GroupName RegionList
ANY    515U1R
SAPLF1 (ALLOCATE ROTATING)
SAPLF1 DK8024 DK8025 DK8026 DK8027 DK8020 DK8021 DK8022 DK8023
:END.
```

```
:EXCLUDE.
  * UserId Address
MAINT 012*
SYSDUMP1 012*
:END.
:AUTOBLOCK.
  * IBM supplied defaults are contained in the AUTOBLK DATADVH file.
  * The following are customer overrides and supplements.
  *
  *DASDType BlockSize Blocks/Unit Alloc_Unit Architecture
:END.
:DEFAULTS.
  * IBM supplied defaults are contained in the DEFAULTS DATADVH file.
  * The following are customer overrides and supplements.
  *
  *DASDType Max-Size
3390              3339
3390-01           1113
3390-02           2226
3390-03           3339
3390-09          10017
:END.
```

Since we allow multiple Linux on zSeries images to simultaneously access the same disk drives, we followed the recommendation in the z/VM driver ReadMe file to turn off CMS minidisk caching.

While logged on to MAINT, we used the following CMS commands to turn this feature off and then display their status:

```
SET MDC RDEV beginning_device ending_device OFF
query mdc rdev 8020-8028, 8120-8128, 8220-8228, 8236-8237
```

Example 3-21 displays the status of our minidisks.

Example 3-21   Outputs of CP query mdc rdev 8020-8028, 8120-8128, 8220-8228, 8236-8237

```
Minidisk cache OFF for 8020
Minidisk cache OFF for 8021
Minidisk cache OFF for 8022
Minidisk cache OFF for 8023
Minidisk cache OFF for 8024
Minidisk cache OFF for 8025
Minidisk cache OFF for 8026
Minidisk cache OFF for 8027
Minidisk cache OFF for 8028
Minidisk cache DFLTOFF for 8120
Minidisk cache OFF for 8121
Minidisk cache OFF for 8122
Minidisk cache OFF for 8123
Minidisk cache OFF for 8124
Minidisk cache OFF for 8125
Minidisk cache OFF for 8126
Minidisk cache OFF for 8127
Minidisk cache OFF for 8128
Minidisk cache OFF for 8220
Minidisk cache OFF for 8221
Minidisk cache OFF for 8222
Minidisk cache OFF for 8223
Minidisk cache OFF for 8224
```

```
Minidisk cache OFF for 8225
Minidisk cache OFF for 8226
Minidisk cache OFF for 8227
Minidisk cache OFF for 8228
Minidisk cache OFF for 8236
Minidisk cache OFF for 8237
```

We created a z/VM vswitch definition with the MAINT userid to allow our dynamically provisioned SAP application servers to be configured with virtual network device addresses and further simplify the overall network configuration.

Note: A customer implementation will probably consist of multiple vswitch definitions, and could also make use of Hipersockets, additional network adapters, and VLANs.

Example 3-22 shows our z/VM vswitch definition.

Example 3-22   Output of CP query vswitch detail command

```
VSWITCH SYSTEM LAN1     Type: VSWITCH Connected: 2     Maxconn: INFINITE
  PERSISTENT  RESTRICTED    NONROUTER                  Accounting: OFF
  VLAN Unaware
  State: Ready
  IPTimeout: 5        QueueStorage: 8
  Portname: UNASSIGNED RDEV: 2E2C Controller: TCPIP    VDEV:  2E2C
    VSWITCH Connection:
      RX Packets: 716996     Discarded: 2390      Errors: 0
      TX Packets: 631703     Discarded: 0         Errors: 0
      RX Bytes: 514223955          TX Bytes: 383407448
      Device: 2E2E  Unit: 002   Role: DATA
    Adapter Owner: SAPCM    NIC: C200  Name: OSA2E20
      RX Packets: 235761     Discarded: 0         Errors: 0
      TX Packets: 108479     Discarded: 0         Errors: 0
      RX Bytes: 234189433          TX Bytes: 14416341
      Device: C202  Unit: 002   Role: DATA
      Options: Broadcast Multicast IPv6 IPv4 VLAN
        Unicast IP Addresses:
          9.12.4.98          MAC: 02-00-00-01-00-00
          FE80::200:0:101:0  MAC: 02-00-00-01-00-00 Local
        Multicast IP Addresses:
          224.0.0.1          MAC: 01-00-5E-00-00-01
          FF02::1            MAC: 33-33-00-00-00-01 Local
          FF02::1:FF01:0     MAC: 33-33-FF-01-00-00 Local
    Adapter Owner: SAPDI    NIC: C200  Name: OSA2E20
      RX Packets: 317405     Discarded: 0         Errors: 0
      TX Packets: 385458     Discarded: 0         Errors: 0
      RX Bytes: 246937824          TX Bytes: 370368819
      Device: C202  Unit: 002   Role: DATA
      Options: Broadcast Multicast IPv6 IPv4 VLAN
        Unicast IP Addresses:
          9.12.4.99          MAC: 02-00-00-00-99-99
          FE80::200:0:100:9999 MAC: 02-00-00-00-99-99 Local
        Multicast IP Addresses:
          224.0.0.1          MAC: 01-00-5E-00-00-01
          FF02::1            MAC: 33-33-00-00-00-01 Local
          FF02::1:FF00:9999  MAC: 33-33-FF-00-99-99 Local
```

Example 3-23 on page 48 lists authorized users of this vswitch definition; for our project, we authorized all of our Linux on zSeries guests access to the vswitch.

Example 3-23   Output of CP query vswitch access command

```
VSWITCH SYSTEM LAN1     Type: VSWITCH Connected: 2     Maxconn: INFINITE
 PERSISTENT  RESTRICTED    NONROUTER                   Accounting: OFF
 VLAN Unaware
 State: Ready
 IPTimeout: 5         QueueStorage: 8
 Portname: UNASSIGNED RDEV: 2E2C Controller: TCPIP    VDEV:  2E2C
   Authorized userids:
     IDADM001 IDADM002 IDADM003 IDADM004 SAPCI    SAPCM
     SAPDI    SYSTEM
```

> **Important:** Because access to a vswitch definition can be authorized prior to the creation of guests, we recommend that you authorize all possible IBM DI system and user naming conventions at one time.

Useful references - VM customizations for IBM DI

We found the following documentation to contain helpful information regarding configuration and setup:

▶ *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00

▶ *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

▶ *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP

3.6 Our Linux guest system setup

Each Linux on zSeries guest system is defined to start with a minimum of 512 MB of memory, and with a maximum boundary of 1 GB. These definitions are visible in Example 3-28 on page 51.

The Linux on zSeries code was installed by initially booting from VM EXEC starter files and then continuing the Linux code installation over the network. Service Pack 3 was then installed via YaST2 control center.

> **Notes:**
>
> ▶ When restarting the VNCSERVER services as requested during the SP3 installation, we had to change the password of the root user to adhere to security conventions in force. Depending on your choice of initial root password, you may or may not have this issue.
>
> ▶ Remember to run `mkinitrd` and `zipl` when finished with SP3 installation. Otherwise, you may not be able to successfully boot your system again.

We also installed two customizations identified in the SAP installation notes, as seen in Example 3-24. Both customizations were downloaded from the SAP service.sap Web site and installed with the Linux `rpm` command.

Example 3-24   RPMs required for JSAP 4.7 Enterprise 6.20 kernel

```
suse-sapinit-200403117-0
saplocales-2.2.5-2
```

Each Linux system has the specific IBM Java software installed to meet the requirements of the SAP installation program that is delivered with each kernel release of SAP code. Our version information is shown in Example 3-25 displays our version information. You can display it on your system with the following command: `rpm -qa | grep -i java`.

Example 3-25   RPMs required for Java for our SAP version

```
IBMJava2-SDK-placebo-1.3.1-87
IBMJava2-SDK-1.3.1-8.0
```

Useful references - Linux guest system setup

We found the following documentation to contain helpful information regarding configuration and setup:

- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1,* BOEE-EUIN-00

- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1*, BOEE-EUIPL-00

- ► *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration,* BOEE-EUIOP

3.6.1 IDI customizations for SAP

We created an SAP logon group to hold the dynamically provisioned servers created by the IBM DI workflows. Our SAP logon group for these servers is called idigrp and contains the two planned servers for dynamic provisioning (idadm001 and idadm002).

We also created a separate logon group for the day-to-day running of the SAP system. These contained the SAP central instance and base dialog instance; see Table 3-6.

Table 3-6   IDI customizations

Group	System
admin	sapci_M5D_00
admin	sapdi_M5D_00
idigrp	idadm001_M5D_00
idigrp	idadm002_M5D_00

3.6.2 The SAP central instance - SAPCI

The SAP central instance is set up to run all SAP processes (Dialog, Update, Enqueue, Batch, Message, Gateway & Spool). It is large enough to accommodate all of our base SAP processing. As a backup, we can make use of the SAPDI server for additional base resources if necessary. Your configuration may vary from this setup, and may require additional resources.

This SAP system NFS exports the SAP file systems except for /sapmnt/M5D/exe, as well as some of the SAP CDs that are needed to install new systems.

We configured and started the SNMP daemon on this system, adhering to the requirements described in the IDI setup publication to allow read only access for everyone. As the SAP system was installed prior to the IBM DI setup, we defined a static real network address for this system's network connection.

Note: You may want to consider setting up a vswitch or Hipersockets for this connection.

As you can see in Example 3-26, the first address defined must be an even address, and the second address must be odd. Therefore, it is possible that the addresses in this file will be in a different order than you specified during your Linux installation.

Example 3-26   SAPCI chandev.conf

```
noauto;qeth0,0x2e24,0x2e25,0x2e26;add_parms,0x10,0x2e24,0x2e26,portname:OSA2E20
```

Example 3-27 shows the fstab file for our SAPCI.

Example 3-27   SAPCI fstab file

```
/dev/rootvg/rootlv      /              reiserfs  defaults 1 1
/dev/dasdb1             /boot          reiserfs  defaults 1 2
/dev/dasdi1             /install       reiserfs  defaults 1 2
/dev/sapcdvg/sapcdlv    /sapcds        ext3      defaults 1 2
/dev/dasdr1             /sapmnt        reiserfs  defaults 1 2
/dev/dasdq1             /usr/sap/M5D   reiserfs  defaults 1 2
/dev/dasdp1             /usr/sap/trans reiserfs  defaults 1 2
/dev/dasda1             swap           swap      pri=42 0 0
devpts                  /dev/pts       devpts    mode=0620,gid=5 0 0
proc                    /proc          /proc     defaults    0 0
```

Disk drive layout for SAPCI

The SAP central instance was installed as a normal SAP installation. The VM user direct entry depicted in Example 3-28 on page 51 shows that we defined one vm minidisk for the guest 191 A disk, and twelve disk drives to hold the Linux file system, the SAP file system, and the assorted CD-ROMs that needed to be mounted for SAP install work to proceed.

The first Linux on zSeries disk is 0201, and it is assigned as the swap partition. Disk 0202 is assigned to /boot. Disks 0203 and 0204 are assigned to /root. This makes up the base Linux file systems needed to start Linux.

Note: We required two disks to hold the /root file system on each Linux system because the SUSE SLES8 code with SP3 would exceed the capacity of a single drive. This required us to configure the Logical Volume Manager (LVM) early in the Linux installation process to support multi-drive file systems.

Disks 0205 through 0208 are assigned to /sapcds, and they hold the various SAP installation CD-ROMs. Disk 0209 is assigned to /install and was the primary SAP installation directory for status and logs. Disk 0210 is assigned to the /usr/sap/trans file system, disk 0211 is assigned to /usr/sapM5D, and disk 0212 is assigned to /sapmnt—these are the SAP file systems that are accessed by all SAP systems in the landscape.

Note: In customer production environments, each customer would probably have further separated the components of the Linux file system into additional separate minidisk definitions (for example, the /usr and /bin directories).

Example 3-28   SAPCI DIRECT A

```
USER SAPCI XXXXXXXX 512M 1024M G                                 03291714
PROFILE IBMDFLT                                                  09161028
  SPOOL 000C 2540 READER *                                       09161028
  SPOOL 000D 2540 PUNCH A                                        09161028
  SPOOL 000E 1403 A                                              09161028
  CONSOLE 009 3215 T                                             09161028
  LINK MAINT 0190 0190 RR                                        09161028
  LINK MAINT 019D 019D RR                                        09161028
  LINK MAINT 019E 019E RR                                        09161028
  LINK MAINT 0402 0402 RR                                        09161028
  LINK MAINT 0401 0401 RR                                        09161028
  LINK MAINT 0405 0405 RR                                        09161028
   IPL CMS                                                       03291714
   MACHINE ESA 03291714
   DEDICATE 2E24 2E24                                            03291714
   DEDICATE 2E25 2E25                                            03291714
   DEDICATE 2E26 2E26                                            03291714
*  0201 is swap                                                  03291714
*  0202 is /boot                                                 03291714
*  0203 is /root                                                 03291714
*  0204 is /root                                                 03291714
*  0205 is /sapcds                                               03291714
*  0206 is more of /sapcds                                       03291714
*  0207 is more of /sapcds                                       03291714
*  0208 is more of /sapcds                                       03291714
*  0209 is /install                                              03291714
*  0210 is /usr/sap/trans                                        03291714
*  0211 is /usr/sap/M5D                                          03291714
*  0212 is /sapmnt                                               03291714
   MDISK 0191 3390 981 20 515U1R MR                              03291714
   MDISK 0201 3390 1 3338 DK8120 MR                              03291714
   MDISK 0202 3390 1 200 DK8121 MR                               03291714
   MDISK 0203 3390 1 3338 DK8122 MR                              03291714
   MDISK 0204 3390 1 3338 DK8123 MR                              03291714
   MDISK 0205 3390 1 3338 DK8124 MR                              03291714
   MDISK 0206 3390 1 3338 DK8125 MR                              03291714
   MDISK 0207 3390 1 3338 DK8126 MR                              03291714
   MDISK 0208 3390 1 3338 DK8127 MR                              03291714
   MDISK 0209 3390 1 3338 DK8128 MR                              03291714
   MDISK 0210 3390 1 3338 DK8220 MR                              03291714
   MDISK 0211 3390 1 3338 DK8221 MR                              03291714
   MDISK 0212 3390 1 3338 DK8222 MR                              03291714
```

Note: To avoid wasting addresses, we *should* have numbered some of our disks using hexadecimal numbering (that is, disks 0210 through 0212 should have been defined as 020A through 020C).

Example 3-29   SAPCI zipl.conf

```
[defaultboot]
default=ipl

[ipl]
target=/boot/zipl
```

```
image=/boot/kernel/image
ramdisk=/boot/initrd
parameters="dasd=201-212 root=/dev/rootvg/rootlv"

[dumpdasd]
target=/boot/zipl
dumpto=/dev/dasd??

[dumptape]
target=/boot/zipl
dumpto=/dev/rtibm0
```

Example 3-29 on page 51 also shows that, due to our setup, we wasted a few addresses by not using hexadecimal numbering for our disk drives.

We had to update our file system's export control file to allow root on other systems to be able to perform any commands necessary during installation. A sample of our /etc/exportfs file is shown in Example 3-30.

Example 3-30   SAPCI exports file

```
/install/tmp        *(ro,root_squash,sync)
/sapcds/master       *(ro,root_squash,sync)
/sapcds/kern        *(ro,root_squash,sync)
/sapmnt/M5D/profile*(rw,no_root_squash,sync)
/sapmnt/M5D/global*(rw,no_root_squash,sync)
/usr/sap/trans        *(rw,no_root_squash,sync)
```

To ensure we had valid TCP/IP definitions for each of our servers, we manually updated our /etc/hosts file on this system, and also updated the same file on each Linux on zSeries system. Example 3-31 displays our definitions for this system.

Example 3-31   SAPCI /etc/hosts file

```
127.0.0.1localhost

# special IPv6 addresses
::1            localhost ipv6-localhost ipv6-loopback

fe00::0        ipv6-localnet

ff00::0        ipv6-mcastprefix
ff02::1        ipv6-allnodes
ff02::2        ipv6-allrouters
ff02::3        ipv6-allhosts

9.12.10.32     T40Laptop.itso.ibm.com  t40laptop       T40Laptop
9.12.4.97      sapci.itso.ibm.com sapci
9.12.4.98      sapcm.itso.ibm.com      sapcm
9.12.4.99      sapdi.itso.ibm.com      sapdi
9.12.4.21      wtsc04oe.itso.ibm.com   wtsc04oe WTSC04OE
9.12.4.20      wtsc04.itso.ibm.com     wtsc04   WTSC04
9.12.4.100     idadm001.itso.ibm.com   idadm001
9.12.4.101     idadm002.itso.ibm.com   idadm002
```

IBM DI documentation stated that we needed to configure and start SNMP. As shown in Example 3-32, there was an update we had to perform in the /etc/snmpd.conf file to support access from any system.

Example 3-32   SAPCI snmpd.conf entry

```
rocommunity public default
```

3.6.3 The base SAP Dialog Instance Master - SAPDI

> **Important:** At this point, keep a record of all disks to be used for all systems, to reduce any future rework.

The SAP Dialog Instance Master Instance is a work area where the base configuration is installed and configured prior to copying to the Configuration Master Instance. Your configuration may vary from this setup, and may require additional resources.

We have configured and started the SNMP daemon on this system. This will, in effect, ensure that the SNMP daemon is installed and auto-started on each of the dynamically provisioned clones without any additional work.

In our case, we configured a static virtual network address for our network adapter on this system, as illustrated by the NICDEF statement in Example 3-33, and by the details in Example 3-34 on page 54.

Example 3-33   SAPDI DIRECT A

```
USER SAPDI XXXXXXXX 512M 1024M G                              04191233
PROFILE IBMDFLT                                               09161028
  SPOOL 000C 2540 READER *                                   09161028
  SPOOL 000D 2540 PUNCH A                                    09161028
  SPOOL 000E 1403 A                                          09161028
  CONSOLE 009 3215 T                                         09161028
  LINK MAINT 0190 0190 RR                                    09161028
  LINK MAINT 019D 019D RR                                    09161028
  LINK MAINT 019E 019E RR                                    09161028
  LINK MAINT 0402 0402 RR                                    09161028
  LINK MAINT 0401 0401 RR                                    09161028
  LINK MAINT 0405 0405 RR                                    09161028
   IPL CMS                                                   04191233
   MACHINE ESA                                               04191233
   NICDEF C200 TYPE QDIO LAN SYSTEM LAN1 MACID 009999        04191233
*  0201 IS SWAP                                              04191233
*  0202 IS /BOOT                                             04191233
*  0203 IS / (ROOT)                                          04191233
*  0204 IS / (BOOT)                                          04191233
   MDISK 0191 3390 1021 20 515U1R MR                         04191233
   MDISK 0C01 3390 1 3338 DK8223 MR                          04191233
   MDISK 0C02 3390 1 400 DK8224 MR                           04191233
   MDISK 0C03 3390 1 3338 DK8225 MR                          04191233
   MDISK 0C04 3390 1 3338 DK8226 MR                          04191233
```

Example 3-34   SAPDI chandev.conf

```
noauto;qeth0,0xc200,0xc201,0xc202;add_parms,0x10,0xc200,0xc202,portname:OSA2E20
```

Disk drive layout for SAPDI

The SAP dialog instance was installed as a normal SAP installation. The VM user direct entry depicted in Example 3-33 on page 53 shows that we defined one vm minidisk for the guest 191 A disk, and four disk drives to hold the Linux file system and the SAP file system. Access to additional data was accomplished by mounting required disk drives from the SAPCI instance via NFS.

The first Linux on zSeries disk is 0C01, and it is assigned as the swap partition. Disk 0C02 is assigned to /boot. Disk 0C03 and disk 0C04 are assigned to /root. This arrangement makes up the base Linux file systems needed to start Linux.

> **Attention:**
>
> ► We changed the addressing of the disk drives to coincide with the recommendations in the IBM DI installation documentation, which states that the default IBM DI workflows will be looking for two particular naming conventions related to disk drives. The workflows assume that drive addresses in the format 0Cxx are system-related, and that addresses in the format 1Cxx are addresses to be cloned during provisioning.
>
> ► We required two disks to hold the /root file system on each Linux system, because the SUSE SLES8 code with SP3 would exceed the capacity of a single drive. This required us to configure the Logical Volume Manager (LVM) functionality early in the Linux installation process to support multi-drive file systems.

Note: In production customer environments, customers would probably have further separated the components of the Linux file system into additional separate minidisk definitions (for example, the /usr and /bin directories).

To minimize the amount of disk utilized for this project, the SAP-specific file systems for this dialog instance are also contained within these four disk drives that hold the standard Linux operating system.

Note: We would expect that customer implementations would have separate full pack disk drives assigned for each SAP-specific file system, in order to allow better administration and control of each entity.

See Example 3-31 on page 52 for a sample of our /etc/hosts file on this system.

3.6.4 The IBM DI SAP Configuration Master Instance - SAPCM

The SAP Configuration Master Instance is the clone source for building the dynamically provisioned servers. It is meant to be a static system that matches the SAP Dialog Instance Master System at all times. See "SAP IBM DI Dialog Configuration Master" on page 15 for information about how we created this system. Note that your configuration may vary from this setup, and may require additional resources.

Since the Dialog Instance Master Server was configured for SNMP, this system will also be configured that way. We configured a static virtual network address for our network adapter on this system, as evidenced by the NICDEF statement in Example 3-35 on page 55 and by the details shown in Example 3-37 on page 57.

Disk drive layout for SAPCM

The SAP Configuration Master Dialog Instance was created by cloning the SAPDI system and running the /etc/init.d/boot.local script at system load time. The VM user direct entry depicted in Example 3-35 shows that we defined one vm minidisk for the guest 191 A disk, and four disk drives to hold the Linux file system and the SAP file system. Access to additional data was accomplished by mounting required disk drives from the SAPCI instance via NFS.

Example 3-35   SAPCM DIRECT A

```
USER SAPCM XXXXXXXX 512M 1024M G                                04191441
   PROFILE LINDFLT                                              04181339
   CLASS G                                                      04181339
   STORAGE 512M                                                 04181339
   MAXSTORAGE 2047M                                             04181339
   IPL C02                                                      04181339
   IUCV ALLOW                                                   04181339
   MACHINE ESA                                                  04181339
   CONSOLE 0009 3215 T                                          04181339
   SPOOL 000C 2540 READER *                                     04181339
   SPOOL 000D 2540 PUNCH A                                      04181339
   SPOOL 000E 1403 A                                            04181339
   LINK MAINT 0190 0190 RR                                      04181339
   LINK MAINT 019D 019D RR                                      04181339
   LINK MAINT 019E 019E RR                                      04181339
   IPL CMS                                                      04191441
   MACHINE ESA                                                  04191441
   NICDEF C200 TYPE QDIO LAN SYSTEM LAN1 MACID 010000           04191441
*  0C01 IS SWAP                                                 04191441
*  0C02 IS /BOOT                                                04191441
*  0C03 IS / (ROOT)                                             04191441
*  0C04 IS / (ROOT)                                             04191441
   MDISK 0191 3390 1001 20 515U1R MR                            04191441
   MDISK 1C01 3390 1 3338 DK8227 MR                             04191441
   MDISK 1C02 3390 1 400 DK8228 MR                              04191441
   MDISK 1C03 3390 1 3338 DK8236 MR                             04191441
   MDISK 1C04 3390 1 3338 DK8237 MR                             04191441
```

The first Linux on zSeries disk is 1C01, and it is assigned as the swap partition. Disk 1C02 is assigned to /boot. Disk 1C03 and disk 1C04 are assigned to /root. This makes up the base Linux file systems needed to start Linux.

> **Important:**
>
> ► We changed the addressing of the disk drives to coincide with the recommendations in the IBM DI installation documentation. It is stated that the default IBM DI workflows will be looking for two particular naming conventions related to disk drives. The workflows will assume that any drive addresses in the format 0Cxx are system related, and any addresses in the format 1Cxx are addresses to be cloned during provisioning.
>
> ► We required two disks to hold the /root file system on each Linux system, as the SUSE SLES8 code with SP3 would exceed the capacity of a single drive. This required us to configure the Logical Volume Manager (LVM) functionality early in the Linux installation process to support multi-drive file systems.

Note: In customer production environments, each customer would have probably further separated the components of the Linux file system into additional separate minidisk definitions (for example, the /usr and /bin directories).

To minimize the amount of disk utilized for this project, the SAP specific file systems for this dialog instance are also contained within these four disk drives that hold the standard Linux operating system.

Note: We would expect that customer implementations would have separate full pack disk drives assigned for each SAP specific file system, in order to allow better administration and control of each entity.

Example 3-31 on page 52 displays a sample of our /etc/hosts file on this system.

```
USER SAPCM XXXXXXXX 512M 1024M G                              04191441
   PROFILE LINDFLT                                           04181339
   CLASS G                                                   04181339
   STORAGE 512M                                              04181339
   MAXSTORAGE 2047M                                          04181339
   IPL C02                                                   04181339
   IUCV ALLOW                                                04181339
   MACHINE ESA                                               04181339
   CONSOLE 0009 3215 T                                       04181339
   SPOOL 000C 2540 READER *                                  04181339
   SPOOL 000D 2540 PUNCH A                                   04181339
   SPOOL 000E 1403 A                                         04181339
   LINK MAINT 0190 0190 RR                                   04181339
   LINK MAINT 019D 019D RR                                   04181339
   LINK MAINT 019E 019E RR                                   04181339
   IPL CMS                                                   04191441
   MACHINE ESA                                               04191441
   NICDEF C200 TYPE QDIO LAN SYSTEM LAN1 MACID 010000        04191441
*  0C01 IS SWAP                                              04191441
*  0C02 IS /BOOT                                             04191441
*  0C03 IS / (ROOT)                                          04191441
*  0C04 IS / (ROOT)                                          04191441
   MDISK 0191 3390 1001 20 515U1R MR                         04191441
   MDISK 1C01 3390 1 3338 DK8227 MR                          04191441
   MDISK 1C02 3390 1 400 DK8228 MR                           04191441
   MDISK 1C03 3390 1 3338 DK8236 MR                          04191441
   MDISK 1C04 3390 1 3338 DK8237 MR                          04191441
```

We wrote and installed the bash script in Example 3-36 to enable automatic modification of the system HOSTNAME and network configuration control file based on the name of the VM guest. (Note that this will only occur once, at first load time, due to the logic in the script.) Additional customization is possible in this script and others, and with the IBM DI workflows.

Example 3-36   SAPCM /etc/init.d/boot.local

```
#! /bin/sh
VAR1=`cat /proc/sysinfo | grep 'VM00 Name' | awk '{print $3}'`
echo $VAR1
     if [ -e /install/chgfile.$VAR1 ]
     then
       echo fc exists $?
     else
       touch /install/chgfile.$VAR1
       file1=chgfile.$VAR1
       echo file1 is $file1
       cp /etc/HOSTNAME.$VAR1 /etc/HOSTNAME
```

```
        cp /etc/sysconfig/network/ifcfg-eth0.$VAR1 /etc/sysconfig/network/ifcfg-eth0
        echo files copied rc $?
     fi
echo end of file
```

Our SAPCM module options are stored in the /etc/chandev.conf file, as shown in Example 3-37.

Example 3-37   SAPCM /etc/chandev.conf

```
noauto;qeth0,0xc200,0xc201,0xc202;add_parms,0x10,0xc200,0xc202,portname:OSA2E20
```

Our SAPCM exports file is shown in Example 3-38.

Example 3-38   SAPCM exports file

```
/sapmnt/M5D/exe*(ro,no_root_squash,sync)
```

Example 3-39 shows the fstab file for our SAPCM.

Example 3-39   SAPCM fstab file

```
/dev/sysvg/syslv          /                      reiserfs  defaults 1 1
/dev/dasdb1               /boot                  reiserfs  defaults 1 2
/dev/dasda1               swap                   swap      pri=42 0 0
devpts                    /dev/pts               devpts    mode=0620,gid=5 0 0
proc                      /proc proc                       defaults    0 0
sapci:/sapmnt/M5D/profile /sapmnt/M5D/profile    nfs       defaults 0 0
sapci:/sapmnt/M5D/global  /sapmnt/M5D/global     nfs       defaults 0 0
sapci:/usr/sap/trans      /usr/sap/trans         nfs       defaults 0 0
```

IBM DI documentation states that we needed to configure and start SNMP. We had to perform one update in the /etc/snmpd.conf file to support access from any system, as seen in Example 3-40.

Example 3-40   SAPCM snmpd.conf file

```
rocommunity public default
```

Note: As mentioned earlier, we should have addressed our disk drives using hexadecimal numbering. However, in the case of this system, we only had a handful of drives, as seen in Example 3-41.

Example 3-41   SAPCM Zipl.conf file

```
[defaultboot]
default=ipl

[ipl]
target=/boot/zipl
image=/boot/kernel/image
ramdisk=/boot/initrd
parameters="dasd=1C01-1C04 root=/dev/sysvg/syslv"

[dumpdasd]
target=/boot/zipl
dumpto=/dev/dasd??
```

```
[dumptape]
target=/boot/zipl
dumpto=/dev/rtibm0
```

4

IBM DI installation and configuration in our sample environment

In this chapter, we discuss specifics relating to our installation of IBM DI in regard to the configuration tasks necessary for IBM DI. While the actual installation of IBM DI can occur in parallel with the SAP build, the actual configuration and connection of IBM DI to the SAP instance must be completed after the SAP base system is installed and the SAP Dialog Instance Master is created and cloned to the SAP Configuration Master.

4.1 Additional IBM DI installation notes

We used the Standard Installer for IBM DI, and the instructions on the screen were self-explanatory. (For more detailed information, refer to *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Guide*.

After we accepted the Software License Agreement, the software prerequisites were checked. This is where the installation of TPM (that is, whether TPM is installed or not) is verified. If the installer cannot find the TPM, a message is displayed; see Figure 4-1.
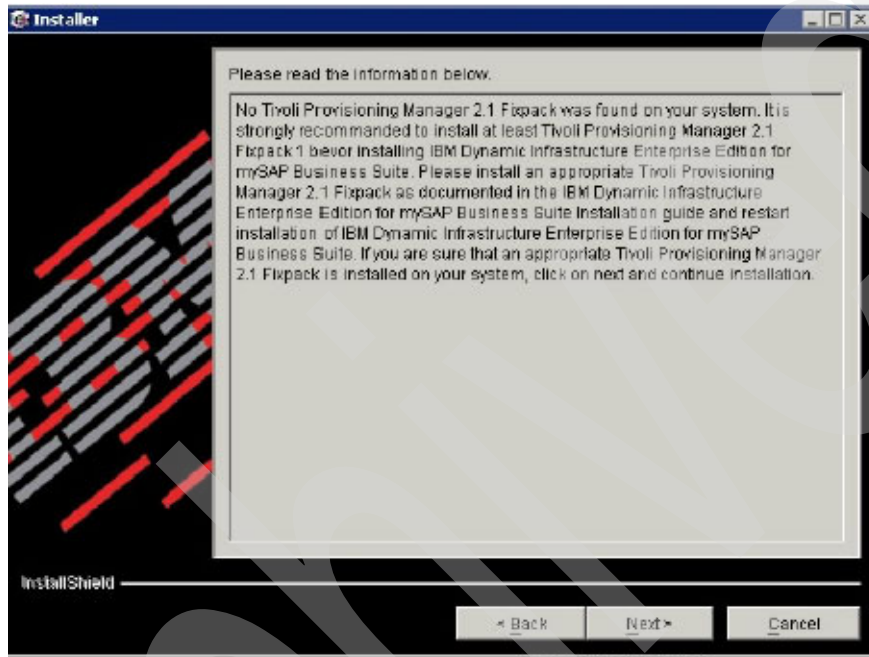

Figure 4-1   Prerequisite verification failure example

During the installation, information regarding the WebSphere Application Server installation is required; refer to "IBM WebSphere Application Server 5.1" on page 22 for installation configuration details. The installer will check the status of the IBM WebSphere Application Server and start the server if it is not already running. If no server connection can be established, the installation stops with an error message.

Upon successful verification of the WebSphere Application Server, the DB2 Utility Business Services (UBS) database connection is configured.

Note: The database instance owner name and password, as well as the database user name and password, must already exist on the DB2SRV database server operating system. If they do not exist already, create them now.

See Figure 4-2 on page 61 for details about how our UBS database was configured.

Figure 4-2   UBS Database configuration parameters

Next, we configured the optimizer (OPT) database; refer to Figure 4-3 on page 62 for details about how we configured our optimizer database.

Figure 4-3   Optimizer database configuration parameters

Since we had already configured LDAP security, we selected **Skip LDAP Configuration** in the next IBM DI installation step. Refer to 3.3.2, "Database and LDAP server on DB2SRV" on page 18 for more details about this configuration.

The remaining steps of the installation are explained in *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Guide.*

4.1.1 Configuring the IBM DI XML files

After installation is successful, you must configure the following files for your environment:

► Offering0001.xml file
► SubscriptionConfiguration.xml

Next, we describe these files in more detail.

Offering0001.xml

Example 4-1 on page 63 shows the Offering0001.xml file that we modified from the template, according to instructions provided in *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Guide*.

As instructed, we modified the following variables in OfferingTemplate.xml and saved the file as Offering0001.xml:

tpmUserid   This is the Tivoli Provisioning Manager administrator
                                                    userid. We used `tioappadmin` because that is what we

	use to log into the TPM system through LDAP. This is also the login userid for the TPM GUI.
tpmPwd	This is the Tivoli Provisioning Manager administrator password.
variationId	This is the topology that you want IBM DI to support for your installation. In our case, we chose variationId030, which corresponds to the variationName.
variationName	This presents a choice of topologies to subscribers. In our sandbox environment, we are only using AppServer: zVM/zLinux; Database: DB2/zSeries.
createWfAttribute: poolId	This is the id number that is displayed when you mouse-over the TPM GUI. To find this, log onto the TPM web interface, and from the left navigator, choose the Inventory tab, then Servers, then, in our case, mouse-over zVM Virtual Server Pool.
createWfAttribute: switchFabricId	This is the id number that is displayed when you mouse-over the TPM GUI. To find this, log onto the TPM Web interface, and from the left navigator, choose **Inventory → Switch Fabrics** then, in our case, mouse-over ITSO_zVM_Fabric.

Example 4-1   Offering0001.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
 *********************************************************************
 * Licensed Materials - Property of IBM
 * 5724-i72
 * (C) Copyright IBM Corp. 2004
 * All Rights Reserved
 * US Government Users Restricted Rights - Use, duplication or
 * disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
 *********************************************************************
-->
<offering xmlns="http://www.ibm.com/xmlns/prod/DynamicInfrastructure"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.ibm.com/xmlns/prod/DynamicInfrastructure ../OfferingCantata.xsd">
    <offeringId key="offeringId" value="Offering0001" reference="none" type="string"/>
    <offeringName key="offeringName" value="IBM Dynamic Infrastructure for mySAP Version 1.0" reference="CP"
type="string"/>
    <provider>
        <providerId key="providerId" value="providerName" reference="CP" type="string"/>
        <orderPreparationUrl key="orderPreparationUrl"
value="http://tpmsrv.itso.ibm.com:9080/euiSapGuiWeb/wsdl/SapSubscriptionControllerPort.wsdl" reference="SE"
type="string"/>
        <ubsFacadeUrl key="ubsFacadeUrl"
value="http://tpmsrv.itso.ibm.com:9080/euiUbsWeb/wsdl/com/ibm/eui/ubs/ejb/facade/UbsFacadeService.wsdl"
reference="SE" type="string"/>
        <seServiceUrl key="seServiceUrl"
value="http://tpmsrv.itso.ibm.com:9080/euiSeWeb/wsdl/com/ibm/eui/se/ServiceEnvironmentService.wsdl"
reference="SE" type="string"/>
        <optimizerServiceUrl key="optimizerServiceUrl"
value="http://tpmsrv.itso.ibm.com:9080/euiSapOptWeb/wsdl/com/ibm/eui/opt/ejb/OptimizerSessionService.wsdl"
reference="SE" type="string"/>
```

```
        <tpmUrl key="tpmUrl" value="http://localhost:9080/tcSoap/servlet/rpcrouter" reference="SE"
type="string"/>
        <tpmUserId key="tpmUserId" value="tioappadmin" reference="SE" type="string"/>
        <tpmPwd key="tpmPwd" value="tioappadmin" reference="SE" type="string"/>
        <providerAdminLanguage key="providerAdminLanguage" value="EN" reference="CA" type="string"/>
    </provider>
    <variation>
        <variationId key="variationId" value="varId030" reference="none" type="string"/>
        <variationName key="variationName" value="AppServer: zVM/ zLinux; Database: DB/ zSeries"
reference="CP" type="string"/>
        <linkToOptionsAndWfs>
            <linkToCreateWF>
                <createServerWfId key="createWfId" value="euisap.CreateServiceEnvironment" reference="SE"
type="string"/>
                <createWfAttribute key="createServerWf" value="euisap.ClusterAddServer" reference="SE"
type="string"/>
                <createWfAttribute key="applicationName" value="AppServer: zLinux/zVM; Database: DB2/ zSeries
" reference="SE" type="string"/>
                <createWfAttribute key="clusterName" value="zSeries SAP2" reference="SE" type="string"/>
                <createWfAttribute key="poolId" value="1320" reference="SE" type="string"/>
                <createWfAttribute key="switchFabricId" value="1242" reference="SE" type="string"/>
                <createWfAttribute key="createServerWfOptimizer" value="euisap.OptimizerClusterAddServer"
reference="SE" type="string"/>
                <createWfAttribute key="getFreeServersInResourcePoolWfOptimizer"
value="euisap.OptimizerGetNumberOfServersInSparePool" reference="SE" type="string"/>
                <createWfAttribute key="meteringMessageJMSHost" value="localhost" reference="SE"
type="string"/>
                <createWfAttribute key="meteringMessageJMSPort" value="2809" reference="SE" type="string"/>
                <createWfAttribute key="meteringMessageJMSUserId" value="tiointernal" reference="SE"
type="string"/>
                <createWfAttribute key="meteringMessageJMSPwd" value="internal" reference="SE" type="string"/>
                <createWfAttribute key="errorMessageJMSHost" value="localhost" reference="SE" type="string"/>
                <createWfAttribute key="errorMessageJMSPort" value="2809" reference="SE" type="string"/>
                <createWfAttribute key="errorMessageJMSUserId" value="tiointernal" reference="SE"
type="string"/>
                <createWfAttribute key="errorMessageJMSPwd" value="internal" reference="SE" type="string"/>
            </linkToCreateWF>
            <linkToDeleteWF>
                <deleteServerWfId key="deleteWfId" value="euisap.DeleteServiceEnvironment" reference="SE"
type="string"/>
                <deleteWfAttribute key="deleteServerWf" value="euisap.ClusterRemoveServer" reference="SE"
type="string"/>
                <deleteWfAttribute key="deleteServerWfOptimizer" value="euisap.OptimizerClusterRemoveServer"
reference="SE" type="string"/>
                <deleteWfAttribute key="cleanupWf" value="euisap.CleanServiceEnvironment" reference="SE"
type="string"/>
                <deleteWfAttribute key="cleanupServerWf" value="euisap.ClusterCleanupServer" reference="SE"
type="string"/>
            </linkToDeleteWF>
        </linkToOptionsAndWfs>
    </variation>
    <optionDeclaration/>
</offering>
```

SubscriptionConfiguration.xml

As part of the SAP base system, the SubscriptionConfiguration.xml file contains configuration parameters and their values. This XML file defines parameters for your specific SAP configuration. There can only be one active subscription per configuration.

The parameters that we had to change for a subscription are listed in Table 4-1

Note: Notice that the customerVlanId and the databaseVlanId and Names are identical. This is because we have a single VLAN in our simple environment. If the database server were residing on a different VLAN, then its number and name would reflect that difference.

Table 4-1   Required Subscription Configuration parameters for our sample environment

Parameter	Explanation	Value
sapSystemId	SAP system ID of the base SAP system.	m5d
centralInstance	Short host name of the SAP central instance.	sapci
sapSystemNumber	System number of the base SAP system.	00
sapClient	SAP client.	000
sapUserId	SAP User ID with DDIC access rights for SAP agent component of metric service for SAP system logon.	m5dopt
sapPassword	Password of sapUserId.	itso4you
sapLogonGroup	SAP logon group for provisioned SAP application servers.	IDIGRP
softwareStackId	During configuration of the solution[a], a software stack must be configured. Use the Tivoli Provisioning Manager GUI and hover the mouse pointer over the configured and imported DCM software stack. The ID of the object will be shown as hover help.	1248
customerVlanId	See previous item.	1244
customerVlanName	The name you choose when planning your solution network.	ITSO_zVM_Fabric - 110
databaseVlanId	During configuration of the solution[b], a software stack must be configured. Use the Tivoli Provisioning Manager GUI and hover the mouse pointer over the configured and imported DCM software stack. The ID of the object will be shown as hover help.	1244
databaseVlanName	The name of the VLAN for the database that you choose when planning your solution network.	ITSO_zVM_Fabric - 110

ldomainSuffix	The domain suffix is the end of the fully qualified host name. For example, in myShop.myCompany.com, myCompany.com is the domain suffix.	itso.ibm.com

a. Refer to *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite: Installation and Configuration* for more detailed information.

b. See preceding footnote.

Example 4-2   SubscriptionConfiguration.xml for our sample environment

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!--
 ********************************************************************
 * Licensed Materials - Property of IBM
 * 5724-i72
 * (C) Copyright IBM Corp. 2004
 * All Rights Reserved
 * US Government Users Restricted Rights - Use, duplication or
 * disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
 ********************************************************************
-->

<!-- edited with XMLSPY v5 rel. 4 U (http://www.xmlspy.com) by Ruediger Maass (IBM Coporation) -->
<configurationParameter xmlns="http://www.ibm.com/xmlns/prod/DynamicInfrastructure"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.ibm.com/xmlns/prod/DynamicInfrastructure ../ConfigurationParameter.xsd">
   <configAttribute key="sapSystemId" value="m5d" reference="SE" type="string"/>
   <configAttribute key="sapSystemId" value="m5d" reference="CA" type="string"/>
   <configAttribute key="centralInstance" value="sapci" reference="SE" type="string"/>
   <configAttribute key="centralInstance" value="sapci" reference="CA" type="string"/>
   <configAttribute key="dlProvMinCpuLoad" value="20" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="dlProvFinishedTime" value="1500000" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="dlSampleInterval" value="60000" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="dlDeprovMaxNumConnectedUsers" value="3" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="sapClient" value="000" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="sapLogonGroup" value="idigrp" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="sapPassword" value="itso4you" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="sapRouterString" value="" reference="SE" type="string"/>
                    <!-- required -->
   <configAttribute key="sapSystemNumber" value="00" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="sapUserId" value="m5dopt" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="sloMaxResponseTime" value="10000" reference="SE" type="string"/>
   <!-- required -->
   <configAttribute key="sapAgentRfcTimeout" value="30000" reference="SE" type="string"/>
   <configAttribute key="msSapMessageTextDeprovisioningRow1" value="WARNING: Your server will shut down
soon." reference="SE" type="string"/>
   <configAttribute key="msSapMessageTextDeprovisioningRow2" value="Please re-login to the SAP system in
order to be assigned" reference="SE" type="string"/>
   <configAttribute key="msSapMessageTextDeprovisioningRow3" value="to another application server."
reference="SE" type="string"/>
```

```
    <configAttribute key="msSapMessageTextProvisioningRow1" value="INFO-Message: New servers have been
provisioned." reference="SE" type="string"/>
    <configAttribute key="msSapMessageTextProvisioningRow2" value="Your current server runs a high work
load. If you" reference="SE" type="string"/>
    <configAttribute key="msSapMessageTextProvisioningRow3" value="re-login you are assigned to a faster
server." reference="SE" type="string"/>
    <configAttribute key="msSapMessageTextProvisioningSendFlag" value="true" reference="SE" type="string"/>
    <configAttribute key="softwareStackId" value="1248" reference="SE" type="string"/>
    <configAttribute key="customerVlanId" value="1244" reference="SE" type="string"/>
    <configAttribute key="customerVlanName" value="ITSO_zVM_Fabric - 110" reference="SE" type="string"/>
    <configAttribute key="databaseVlanId" value="1244" reference="SE" type="string"/>
    <configAttribute key="databaseVlanName" value="ITSO_zVM_Fabric - 110" reference="SE" type="string"/>
    <configAttribute key="maxNumberOfServers" value="4" reference="SE" type="string"/>
    <configAttribute key="minNumberOfServers" value="1" reference="SE" type="string"/>
    <configAttribute key="domainSuffix" value="itso.ibm.com" reference="SE" type="string"/>
</configurationParameter>
```

4.2 IBM DI-installed workflows into TPM

Upon IBM DI installation, the euisap.tcdriver is installed in TPM. This driver is found in the %TIO_HOME%\drivers directory. You can use a common unzip tool like WinZip to view the files that are installed into TPM that support IBM DI.

Among those files are a list of the TPM workflows written specifically to support IBM DI. Table 4-2 lists each workflow with a brief description of its function.

Table 4-2   Workflows installed into TPM that support IBM DI

Workflow name	Workflow function
workflow/euisap.AnalyseSoftwareStack.wkf	Workflow to analyze a DCM SW stack for image and regular types
workflow/euisap.NumberOfServersInCluster.wkf	Workflow to query the number of servers in a cluster
workflow/euisap.CollectServerStatus.wkf	Workflow to query the server status and send it back as serialized string to caller
workflow/euisap.CheckForNoServersInTransition.wkf	Workflow to query the number of servers are in transition state within a cluster
workflow/euisap.DCMCreateApplication.wkf	Workflow to create an application
workflow/euisap.DCMCreateCluster.wkf	Workflow to create a cluster
workflow/euisap.DCMCreateCustomer.wkf	Workflow to create a customer
workflow/euisap.DCMDeleteApplication.wkf	Workflow to delete an application
workflow/euisap.DCMDeleteCluster.wkf	Workflow to delete a cluster
workflow/euisap.DCMDeleteCustomer.wkf	Workflow to delete a customer
workflow/euisap.NumberOfServersInSparePool.wkf	Workflow to query the number of servers within a spare pool
workflow/euisap.RefreshLogConfiguration.wkf	Workflow to re-read the logging configuration

Workflow name	Workflow function
workflow/euisap.ResetServer.wkf	Workflow to set a server from failed into available state
workflow/euisap.GetJmsParameter.wkf	Workflow to retrieve the JMS queue parameter
workflow/euisap.SeparateSoftwareStack.wkf	Workflow to separate image SW stack from regular SW stack (if used)
workflow/euisap.CopyFileFromLocalRepository.wkf	Workflow to copy a single file to target system
workflow/euisap.CopyFilesFromLocalRepository.wkf	Workflow to copy multiple files to target system
workflow/euisap.IPSystemRemoveIPAddress.wkf	Workflow with noop to execute LDO base operations (this keeps the DCM model in sync)
workflow/euisap.ImageSoftwareStackInstall.wkf	Workflow to execute the image SW stack install using the boot server
workflow/euisap.SoftwareStackUninstall.wkf	Workflow to uninstall a SW stack
workflow/euisap.SoftwareInstall.wkf	Workflow to install a SW product SAP Application Server
workflow/euisap.SoftwareUninstall.wkf	Workflow to uninstall a SW product SAP Application Server
workflow/euisap.SoftwareUpdateStatus.wkf	Workflow to update the SW install status
workflow/euisap.FindTsaServiceIP.wkf	Workflow to find an existing server in the same cluster to execute serverctrl command
workflow/euisap.IsClusterEmpty.wkf	Workflow to test whether cluster is empty
workflow/euisap.IsExactlyOneServerInCluster.wkf	Workflow to test if exactly one server is left in the cluster
workflow/euisap.TsaSoftwareInstall.wkf	Workflow to install and enable the TSA SW product
workflow/euisap.TsaSoftwareUninstall.wkf	Workflow to uninstall and disable the TSA SW product
workflow/euisap.ResetServer.wkf	Workflow to reset or initialize a server
workflow/euisap.ManualClusterAddServer.wkf	Workflow to enable manual execution of LDO Cluster.AddServer
workflow/euisap.ManualClusterRemoveServer.wkf	Workflow to enable manual execution of LDO Cluster.RemoveServer
workflow/euisap.ClusterAddServer.wkf	Workflow to execute LDO Cluster.AddServer
workflow/euisap.ClusterRemoveServer.wkf	Workflow to execute LDO Cluster.RemoveServer
workflow/euisap.ClusterAddSelectedServer.wkf	Workflow to add a specific server to a cluster after checking prerequisites

Workflow name	Workflow function
workflow/euisap.ClusterRemoveSelectedServer.wkf	Workflow to remove a specific server from a cluster after checking prerequisites
workflow/euisap.ClusterRelocateSelectedServer.wkf	Workflow to exchange an existing server in a cluster using TSA functionality
workflow/euisap.ClusterCleanupServer.wkf	Workflow to execute LDO Cluster.RemoveServer failure tolerant
workflow/euisap.OptimizerGetNumberOfServersInSparePool.wkf	Workflow wrapper for optimizer usage of query the number of servers within a spare pool
workflow/euisap.OptimizerClusterAddServer.wkf	Workflow wrapper for optimizer usage to execute LDO Cluster.AddServer
workflow/euisap.OptimizerClusterRemoveServer.wkf	Workflow wrapper for optimizer usage to execute LDO Cluster.RemoveServer
workflow/euisap.CleanServiceEnvironment.wkf	Workflow to delete failure tolerant a service environment that consists of cluster, application and customer
workflow/euisap.DeleteServiceEnvironment.wkf	Workflow to delete a service environment that consists of cluster, application and customer
workflow/euisap.CreateServiceEnvironment.wkf	Workflow to create a service environment that consists of cluster, application and customer

5

Dynamic provisioning and deprovisioning of SAP application servers

As mentioned in 1.1, "Dynamic provisioning concepts" on page 2, *provisioning* is the dynamic allocation of resources. It is "dynamic" because it occurs as needed. In our sample customer example, the different divisions of the Dexter Petrol Company, such as Dexter EMEA and Dexter AP, would dynamically allocate resources during their peak load times.

In this chapter we introduce the IBM DI Workflow models and discuss the creation of policies, as well as policy-based provisioning and deprovisioning of servers.

5.1 IBM DI workflow

The provisioning process is triggered by a customer that subscribes to an offering. Before the customer can do that, the IBM Dynamic Infrastructure administrator must configure a valid ratings package that is used to bill the resources used by this customer.

To illustrate a simple provisioning step executed by the IBM DI solution, as shown in Figure 5-1, we take a look at our sample company Dexter Petrol Company and its departments.
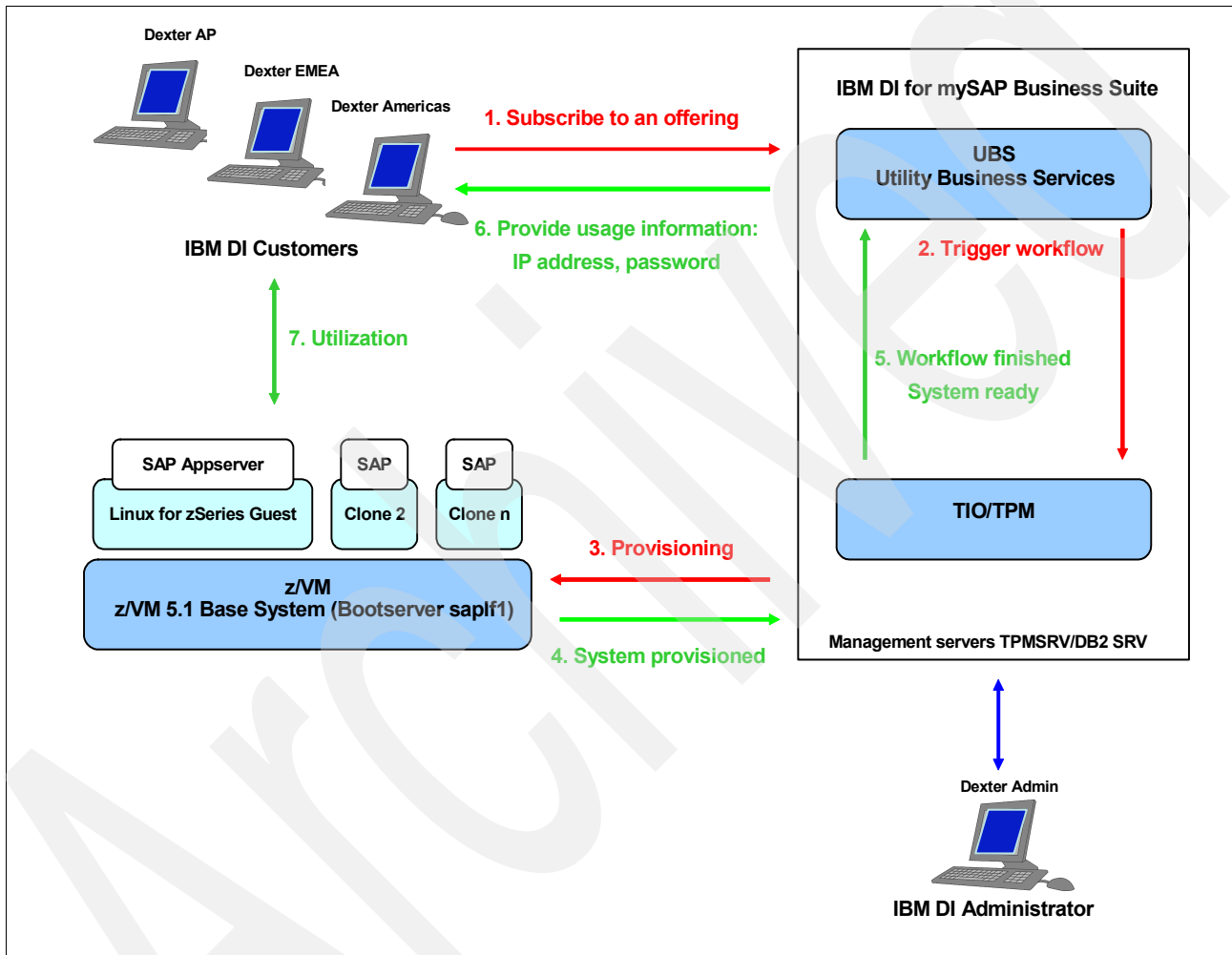

Figure 5-1   IBM DI process workflow

The following steps correspond to Figure 5-1.

1. One of the Dexter Petrol Company departments (for example, Dexter AP) uses the IBM DI GUI to subscribe to an offering. The department chooses an offering and sets the service level agreements (SLAs) it wants to use. UBS then gathers and stores all property data needed for the correct rating, contracting, accounting and metering of this request that is connected with this subscripting.

2. UBS generates a subscription id and sends a message to the Tivoli Provisioning Manager to trigger the appropriate TPM workflows that set up and configure all resources needed by this subscription.

3. TPM itself then issues commands and triggers several scripts that come with the Automation Packages (found in the TC driver) and are available for different kinds of target platforms. In our case, the workflows create one or more new Linux for zSeries guests on our z/VM system and install and configure an SAP application server on it.

4. After a successful provisioning, the new application server is put into the SAP logon group of our utilized SAP system and can now be used by all users of this system. TPM, which monitors the successful execution of all workflows, marks the new resource as used and moves its data center model representation within TPM from the free server pool to the utilized server pool.

5. TPM signals UBS that all workflows were executed successfully and the resource is ready to use.

6. UBS informs the customer (Dexter AP) that the resources associated with the offering subscribed to are ready to use. It also provides all needed usage information, for example IP addresses and passwords. At the same time, UBS starts metering this resource for later billing purposes.

7. At this point, the customer (Dexter AP) is able to use the new resource provisioned by IBM DI.
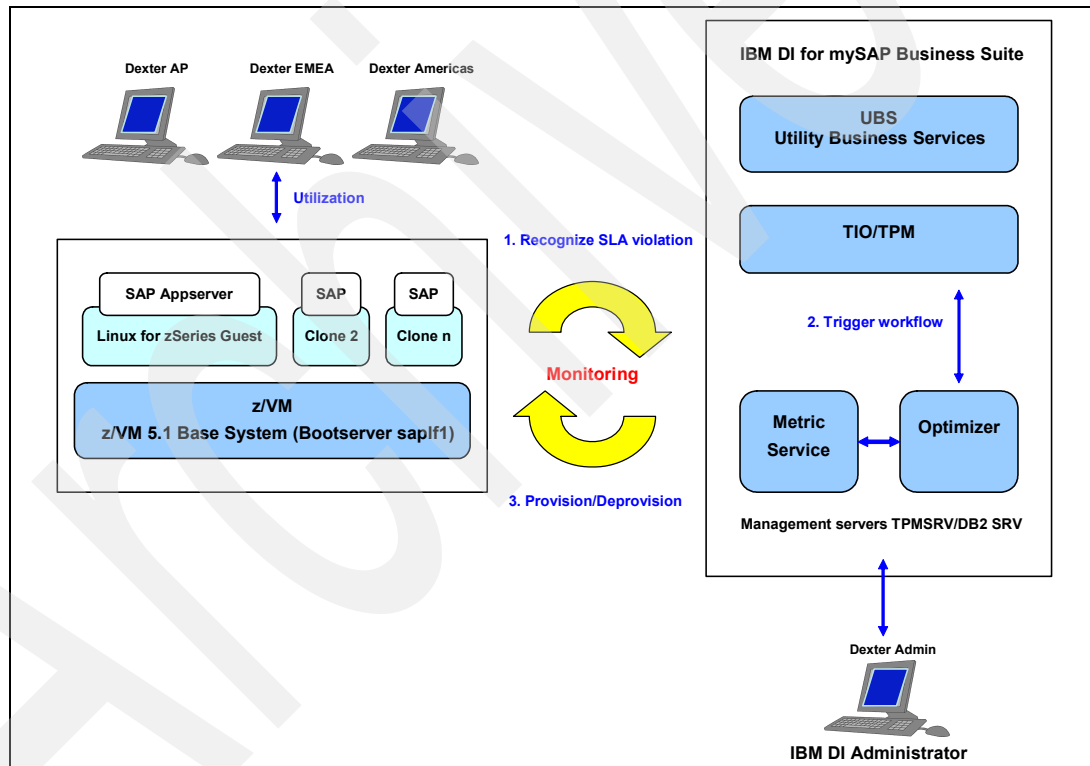

Figure 5-2   IBM DI MAPE loop

IBM DI monitors the utilization of the provisioned SAP application servers all the time. A process (called the MAPE loop) monitors (M) the system utilization, analyzes (A) the monitoring data, plans (P) adjusting steps, and executes (E) these steps to meet the service level agreement that is required by the customer.

The following steps correspond to Figure 5-2.

1. The MAPE process within IBM DI monitors the utilization of the provisioned SAP application servers and tries to recognize any SLA parameter violations or underutilization of the system.

2. If an SLA violation or underutilization of servers is detected, IBM DI triggers appropriate workflows.

3. These workflows either provision a new resource (in the case of an SLA violation), or deprovision an underutilized SAP application server to free valuable resources for other tasks. In both cases, TPM updates its data center model to reflect the changes it made.

5.2 Using policies in IBM DI

In TPM, a *policy* is a service level objective. In IBM DI, a *ratings package* is created that outlines the policy that will trigger the IBM DI workflows in TPM.

In IBM DI, a *rating* is a range of values and price of units in a range. You can group collections of ratings into a package, using IBM DI, by defining these ranges of units and charge for each range.

To create a policy in IBM DI, the administrator (in our case, dexteradmin) creates a rating package. The ratings that can be modified in a rating package are CPU seconds, application server hours, dialog steps per hour and connected users per hour. The administrator can create a rating package that includes any or all of these ratings by simply checking or unchecking the box in the Use column.

> **Note:** For a full explanation of creating and managing rating packages, refer to *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration Guide Version 1 Release 1.*

CPU seconds and application server hours are measured during a reporting interval. The reporting interval is agreed upon between the decision makers of the organization and the owners of the system, and is a summed result for the agreed upon time period.

CPU seconds indicates the number of CPU seconds, summed up over a reporting interval. For example, in Figure 5-3 on page 75, this business policy states that organizations that use between 0 and 50 CPU seconds will be charged USD $1 per CPU second, while those using between 50 CPU seconds and 100 CPU seconds be charged USD $0.80. Anything over 100 CPU seconds will be charged USD $0.60.

The application server hours is a sum of the SAP application server hours used by the organization subscription. For example, in Figure 5-4 on page 76, 682.99 SAP application server hours were used. The ratings package used is shown in Figure 5-3 on page 75. Since 682.99 application server hours is between 0 and 720, the charge would be USD $10.00 per application server hour, or USD $6829.90.

The number of dialog steps for each hour can also be retrieved for the requested subscription or subscriptions. If more than one subscription is handled, the sum for the dialog steps per hour is computed per hour over all subscriptions.

The number of connected users per hour is retrieved for the requested subscription or subscriptions. If more than one subscription is handled, the sum for the connected users is computed per hour over all subscriptions.

Figure 5-3   Sample ratings package

Note: When creating rating packages and adding rows, the minimum column of one row must be equal to the maximum value of the row above it. The last value of the range must be "infinite" and must be a string with no quotes and be in lower case.
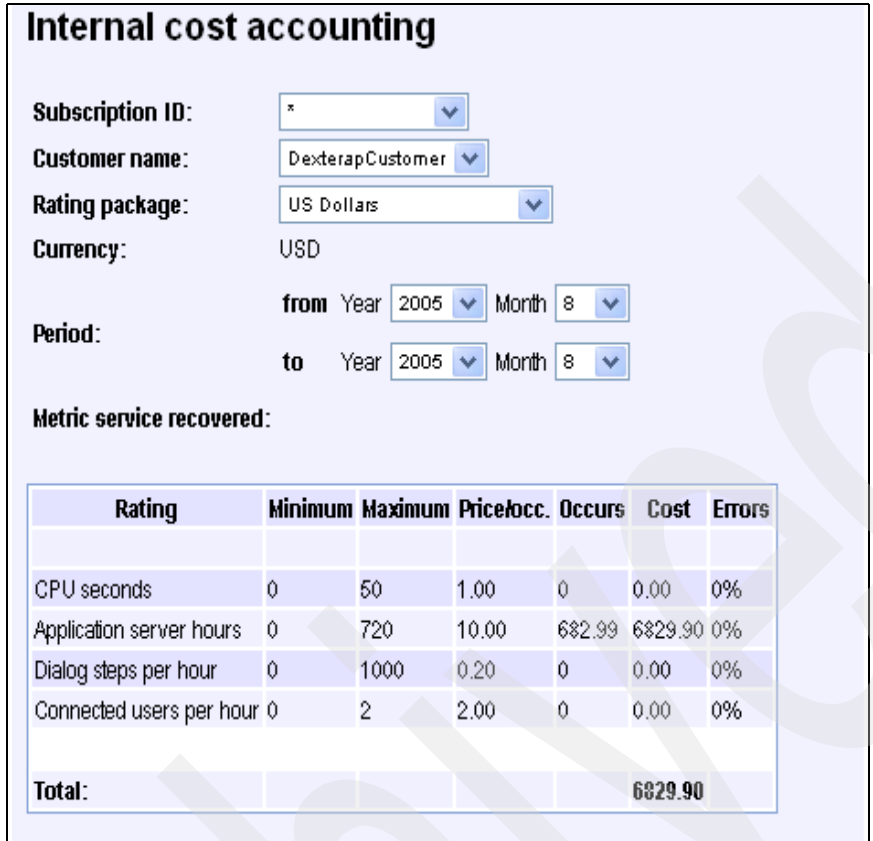
Figure 5-4   Example of internal cost accounting report

5.3 IBM DI roles - tying it together

This section provides a brief glimpse of who is allowed to do what from the IBM DI Web browser. As you recall from Example 3-1 on page 26, we created four groups in LDAP that represent the user roles used by the IBM DI GUI to manage access rights:

- ► OfferingProviderAdministrator

- ► OfferingServiceManager

- ► ODSProviderAdministrator

- ► OfferingSubscriber

Figure 5-5 on page 77 lists the actions that IBM DI has available, the users that can perform these actions in the Dexter Petrol Company (so that you can relate this to our sandbox environment), and the IBM DI groups that those users would be assigned to in LDAP.

Action	Role in Dexter Petrol Company	Corresponding IBM DI Role
Export subscription report	dexterap, dexteremea,dexteramericas	`OfferingSubscriber`
Cancel subscription	dexterap, dexteremea,dexteramericas	`OfferingSubscriber`
Delete Subscription	dexteradmin	`OfferingProviderAdministrator`
Export billing input report	dexterservicemanager	`OfferingServiceManager`
Export internal cost accounting report	dexteradmin	`OfferingProviderAdministrator`
Export internal cost accounting report	dexterservicemanager	`OfferingServiceManager`
Export internal cost accounting report	dexterodsadministrator	`ODSProviderAdministrator`
Export SLA report	dexteradmin	`OfferingProviderAdministrator`
Export SLA report	dexterservicemanager	`OfferingServiceManager`
Export subscription details	dexteradmin	`OfferingProviderAdministrator`
Export subscription details	dexterservicemanager	`OfferingServiceManager`
Export subscription details	dexterap, dexteremea,dexteramericas	`OfferingSubscriber`
Export subscription report	dexteradmin	`OfferingProviderAdministrator`
Export subscription report	dexterservicemanager	`OfferingServiceManager`
Generate billing input report	dexterservicemanager	`OfferingServiceManager`
Generate Internal Cost Accounting Report	dexteradmin	`OfferingProviderAdministrator`
Generate internal cost accounting report	dexterservicemanager	`OfferingServiceManager`
Generate internal cost accounting report	dexterodsadministrator	`ODSProviderAdministrator`
Generate SAP Application Server Status Report	dexteradmin	`OfferingProviderAdministrator`
Generate SLA Report	dexteradmin	`OfferingProviderAdministrator`
Generate SLA report	dexterservicemanager	`OfferingServiceManager`
Generate subscription status report	dexterservicemanager	`OfferingServiceManager`
Generate Subscription Status Report	dexteradmin	`OfferingProviderAdministrator`
Generate subscription status report	dexterap, dexteremea,dexteramericas	`OfferingSubscriber`
Rating Package Editor	dexteradmin	`OfferingProviderAdministrator`
Rating Package Viewer	dexteradmin	`OfferingProviderAdministrator`
Rating package viewer	dexterodsadministrator	`ODSProviderAdministrator`
Rating package viewer	dexterservicemanager	`OfferingServiceManager`
Rating package viewer	dexterap, dexteremea,dexteramericas	`OfferingSubscriber`
Start and stop automatic provisioning	dexteradmin	`OfferingProviderAdministrator`
Subscribe to offering	dexterap, dexteremea,dexteramericas	`OfferingSubscriber`

Figure 5-5   Actions and corresponding roles in relation to IBM DI

6

A demonstration of cost transparency

Cost transparency provides visibility of costing information. Knowing where costs are incurred can help to reduce those costs. While the guide *IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration* is an excellent additional resource on this subject, this chapter demonstrates how using the accounting and metering components of IBM DI enables full cost transparency to the Dexter Petrol Company and its global divisions.

Part of the IBM DI infrastructure is the Utility Business Services (UBS) component, which is made up of several subcomponents:

► Controller
► Contracting
► Rating
► Metering
► Accounting

Dynamic, policy-based provisioning and de-provisioning of the SAP Application Server provides cost transparency through the use of:

► Metering, which collects and stores service consumption data that is then used as input to the billing reports

► Accounting, through the use of reporting by providing:

– Billing input
– Internal cost accounting
– Service Level Agreements compliance

79

6.1 Providing billing input

The rating, accounting and metering components of UBS are responsible for calculating the usage charges of the services provided. Billing input is based on the metering data. This data is one of three reports available from the UBS Accounting service and can exported to a file for use as input to your organization's accounts payable system.

The billing input report is used to calculate the charges for a service according to the rating package for that subscription. It is based on service consumption. In our example, DPC EMEA may use less CPU than DPC Americas and therefore would want to be billed only for what they used.

At this time, IBM DI provides input in the form of a comma-separated value (CSV) file that can be imported into an organization's current billing system. CSV is a standard file format used for import by most applications.

To generate a billing input CSV file, you would first follow the process to generate a billing input report:

1. From your IBM DI Web site, select **Subscriptions** from the left navigation bar.
2. On the Subscriptions panel, select the radio button in front of the subscription from which you want to generate a report.
3. Click **Billing**. The billing input panel appears.
4. Specify a time frame. The report will include the day you specify in the "from" time fields and also includes the day you specify in the "to" time fields.
5. Instead of clicking Refresh to generate the report, click **Export** to save the report in the CSV file format.
6. Save this file to import into your billing application.

Example

In this example, both DPC EMEA and DPC Americas have a service that runs for four hours. The rating package that both organizations subscribe to, shown in Table 6-1, specifies that all DPC divisions will be charged only for connected users per hour.

Table 6-1   DPC's company-wide rating package

Interval ID	Number of users	Cost (in USD) per user
A	$0 \leq x < 30$	$120
B	$30 \leq x < 100$	$100
C	$100 \leq x < infinity$	$60

Activity for DPC EMEA and DPC Americas is displayed in Table 6-2, and is captured in the meter events.

Table 6-2   Table of activity

Hour	Connected users in EMEA	Connected users in Americas
1	10	150
2	30	75
3	50	30
4	101	10

The charges to DPC EMEA would be calculated as demonstrated in Table 6-3.

Table 6-3   DPC EMEA's charges, based on users per hour

Hour	Number of users x cost per user	Total
1st	10 users (which falls in interval id A) x $120	$1200
2nd	30 users (interval id B) x $100	$3000
3rd	50 users (interval id B) x $100	$3000
4th	101 users (interval id C) x $60	$6060
Total		$15,260

The DPC Americas charges would be calculated as demonstrated in Table 6-4.

Table 6-4   DPC Americas' charges, based on users per hour

Hour	Number of users x cost per user	Total
1st	150 users (which falls in interval id A) x $60	$9000
2nd	75 users (interval id B) x $100	$7500
3rd	30 users (interval id B) x $100	$3000
4th	10 users (interval id C) x $120	$1200
Total		$20,700

Summary

While this example is simplistic, monitoring the division's monthly charges can assist each division in better managing and planning its budget, based on past experiences.

Preview of IBM DI Release 2

While this very brief preview does not serve as any sort of an announcement, preparing your environment and infrastructure using IBM DI Release 1 of the product will allow business decisionmakers and systems administrators the opportunity to understand and map out their current mySAP Business Suite environment in order to create SLAs and business policies that will best leverage corporate server resources.

With IBM DI Release 2, more options to satisfy more scenarios will enable your business to:

► Further lower IT operation costs for running SAP environments

► Better utilize servers through sharing of resources between SAP systems

► Automate standard administration tasks to lower administration costs and to enhance efficiency

► Enable quicker changes to the IT infrastructure to meet business requirements and enhance competitiveness

A

Sample installation checklists

While every installation will differ in some ways, depending on your particular infrastructure, in this appendix we show sample installation checklists and present the order of installation that we found would provide the most successful path to complete installation.

While some of this information is repeated in other parts of this redbook, it is included here for ease of copying or printing for project planning purposes.

Tasks necessary to set up the DB2 for z/OS environment

- ► After installation, determine your DB2 SSID - DB7U
- ► IRLM SSIDI - D7U
- ► OS/390® System name - SC04
- ► Command Prefix - db7u
- ► Target Data Set - HLQDB7U7
- ► User Data Set - HLQDB7UU
- ► DRDA Port n/a
- ► Resync Port n/a
- ► ISPF panel option - 7U
- ► Volumes - TOTDE0-TOTDEF (sms-managed)
- ► VTAM® LUSCPDB7U
- ► PROCLIBs - DB7UU.PROCLIB===> contains the DSN** procs
- ► SYS1.PROCLIB===> contain the DB7U** procs

DB2 other:
DB2 High Level qualifier, SAPR3, defined as secondary auth id of ICLIM5D & M5DADM

DB2 DSNZPARMs used on DB2 subsystem DB7U

Our DB2-specific DSNZPRMS are shown in Example A-1.

Example: A-1   DB2-specific DSNZPRMS

```
CONTSTOR=YES
DSMAX=6000
MAXKEEPD=10000
NUMLKTS=0
NUMLKUS=0,
CTHREAD=1900
IDBACK=1800
IDFORE=40,
ASCCSID=819
SCCSID=37
SSID=DB7U
```

Tasks necessary to set up SAP

General preparation steps

- ► Order SAP and IBM software
- ► Create technical support team
- ► Perform an SAP sizing
- ► Hold a planning session with stakeholders
  - AIX
  - z/OS
  - DB2
  - z/VM
  - Linux on zSeries
  - Network
  - IBM DI
  - Data Center
  - Windows
  - Complementary software
- ► Document all parameters required for SAP installation
  - Where is the table name /. #?

DB2 subsystem names	DB2 group attach name	Datasets to be used
SAP system name	SAP instance numbers	SAP installation ID
SMS volsers	VTOC,VVDS & catalog sizes	USS parms
/etc/services ports to use	ICLI / DRDA parms	Grants / Binds
Userids to be used	Security authorizations	

- ► Perform software installations
- ► Perform backup and start recovery planning
- ► Create a technical support team
- ► Get an SAP sizing done

> **Note:** For assistance with SAP sizing activities, contact:
>
> `ezizings@us.ibm.com`

- ► Hold a planning session to ensure the following activities have occurred and that people have prepared adequately:
  - Identify the people resources with the skills required:

    z/OS; RACF; USS; Storage; Network; AIX; NT; Linux; DB2; BASIS

- ► Gather documentation
- ► Obtain IBM Information APAR II11352
- ► Obtain SAP Service Marketplace OSS Note 81737
- ► Search for and gather SAP installation notes for your release

  https://service.sap.com/notes

- ► Obtain SAP on DB2 for z/OS planning guides for your application and release level

  > **Note:** The names of the planning guides may change with each SAP release, and you must ensure that you acquire both the SAP ABAP and SAP WAS guides if they are separate for your application and release.

- ► Obtain SAP on DB2 for z/OS installation guides for your application and release level

  https://service.sap.com/instguides

- ► For reference, obtain the IBM Redbook *SAP R/3 on DB2 for OS/390:Disaster Recovery*, SG24-5343
- ► Other miscellaneous documentation to obtain:
  - – Linux
  - – SAP
  - – z/VM
  - – z/OS
  - – Tivoli
  - – IBM DI
- ► Identify and begin downloading the appropriate SAP service packages and program patches you will require. (Because these files can be quite large, you will want to get this activity started early in the project.) The primary interface to begin this activity from is the SAP Service Marketplace:

  https://service.sap.com/swdc

- ► Ensure you have access to a UNIX® or Linux system from which to do the SAP installation. If that is not possible, then acquire a software package that allows you to run X-Windows (X-Windows is required to run the SAP installation program SAPINST) and Secure Shell (ssh). We used CYGWIN and PuTTY, downloaded from the Internet for free.
- ► Identify and obtain the pertinent IBM Java SDK that will be needed by the SAP installation program and download the code.

  > **Note:** We used IBMJava2-SDK-1.3.1-8.0 per the SAP requirement in Note 81737:
  >
  > - ► sapci:/ # java -version
  > - ► Java version 1.3.1
  > - ► Java 2 Runtime Environment, Standard Edition (build 1.3.1)
  > - ► Classic VM (build 1.3.1, J2RE 1.3.1 IBM build cx390131-20041210 (JIT enabled: jitc))

- ► Identify and obtain the pertinent additional RPMs required, as stated in SAP Service Marketplace OSS Note 81737. Ensure that you download the RPMs that correspond to *your* implementation (32-bit or 64-bit).

> **Note:** We identified and obtained the following:
> - saplocales-2.2.5-2
> - suse-sapinit-200403117-0

- Schedule and execute a planning session to ensure you have identified all activities, tasks, and data points required for installation of the SAP code.

- Obtain all required hardware and software.

- Plan and install your connection to SAP, commonly referred to as your *OSS Connection*.

At a minimum get started on your backup and disaster recovery (DR) plans, and plan to have those completed shortly after installation of your first SAP system. Information that can guide you in developing those plans can be found at the following site:

http://linuxvm.org

Following are some details of our setup:

- 400 track VTOCs for each DASD volume
- 180 track VVDSs
- 50 track VTOC Index
- 50 cylinder primary and 5 cylinder secondary allocations for the ICF Catalog for DB2

Table A-1 shows the values we used for various variables in our setup, and includes space where you can fill in the values for your configuration.

Table A-1   Variable values

Variable	Our value
SAP installation userid	zLinux uses root
Userid to run ICLI	ILCIM5D
<sidadm> userid	m5dADM
RACF Passtickets to be used?	No
Update BPXPRMxx	
ICLI port number	13000
DSNZPARMS	As per SAP installation guide
DB2 security authorizations	Grants per SAP installation guide
SAP CI File systems to export	/usr/sap/M5D /usr/sap/trans /sapmnt
SAP message	
SAP DI file systems to export	/sapmnt/M5D/exe

Tasks necessary to set up management servers

> **Note:** We used the Tivoli Provisioning Manager (TPM) rather than Tivoli Intelligent Orchestrator (TIO) for our installation.
>
> If you use TIO, IBM DI will fail to find the TPM and refuse to install. A workaround would be to modify some scripts; however, it is not recommended that you do this without explicit directions from IBM support.
>
> For IBM DI, Release 1, it is recommended that you use TPM rather than TIO.

This section lists the order of all tasks needed for a successful installation of the management servers for IBM DI. We used our server names in this list so that you could cross-reference them with Figure 3-1 on page 8.

While most of the tasks can be completed in parallel with the SAP build, the actual configuration and connection of IBM DI to the SAP instance must be completed after the SAP base system is installed and the SAP Dialog Instance Master is created and cloned to the SAP Configuration Master.

1. **TPMSRV:** Ensure that Java 1.4.2 is installed
2. **TPMSRV:** CYGWIN
3. **TPMSRV:** WebSphere Application Server v5.1 (do *not* put spaces in the directory file names)
4. **TPMSRV:** WebSphere Application Server fix pack 3 (although we found that fix pack 4 also worked in our solution)
5. **TPMSRV:** MQ Patch IC38409
6. **TPMSRV:** DB2 v8.1 Administration Client
7. **TPMSRV:** DB2 v8.1 Administration Client fix pack 3
8. **DB2SRV:** DB2 UDB v8.1
9. **DB2SRV:** DB2 UDBv8.1 fix pack 3
10. **DB2SRV:** Tivoli Directory Services v5.2
11. **DB2SRV:** Tivoli Directory Services v5.2 fix pack 2
12. **DB2SRV:** Replace the v3.ibm.at file with the newest version (found on the IBM DI product CD 6)
13. **TPMSRV:** IBM Tivoli Provisioning Manager v2.1
14. **TPMSRV:** Java Connector (JCo) v2.0.10
15. **TPMSRV:** IBM Dynamic Infrastructure for mySAP Business Suite Release 1

Tasks necessary to set up Linux on z/VM

This section describes the steps completed for our system. Prior to setting up Linux on z/VM, meet with *your* team to plan your requirements and assign responsibility for each area or activity.

For our team, the z/VM system was already installed, and was named VMLINUX5 with TCPIP address 9.12.4.129. We verified our maintenance level.

DIRMAINT was configured to allow us to create VM Linux Guest userids. It was also configured to allow the Tivoli management workflows to connect to a special VM userid we built that handles the workflow VM API interfaces to VSMSERVE.

In our case, we already had the 64-bit SuSE SLES8 code downloaded and available on a central software repository server accessible by both ftp and sftp, so we did not have to spend much time acquiring the code. We also were able to have local access to the SuSE SLES8 SP3 code on the same server, which made it easy to upgrade the initial installation of Linux to the kernel level required by SAP in OSS note 81737. In your case, you will want to ensure that you have the code in-house before you begin your project.

We held a planning meeting with the local ITSO networking team to work out the IP addresses and host names of the various systems. In our environment, there was no access outside of the private network to the Internet at large, so it was also necessary for us to plan ahead of time how we were going to get necessary code fixes to the machines.

Our installation of the SAP central instance and the main SAP dialog instance would be considered a normal SAP installation, for the most part. We installed all SAP processes on this system (dialog, update, enqueue, batch, message, gateway and spool) and configured the NFS server to export the three main SAP filesystems (/sapmnt; /usr/sap/M5D; and /usr/sap/trans). The next three Linux systems had specific requirements.

The version of YaST we ran was not capable of properly creating all of the volume group and logical volume definitions, and we were forced to update the /etc/fstab file manually.

The IBM DI SAP dialog instance master system is where the initial work to build a clonable dialog instance is begun. It is also where we loaded a local copy of the SAP executables during the SAP dialog instance installation to set the stage for being able to export the /sapmnt/M5D/exe file system from the IBM DI SAP configuration master system so that the dynamically provisioned clones could run with the configuration master code set.

Contrary to what is in the various IBM DI installation manuals, we did not run DHCP or DNS servers on our Linux machines, as we already had these services provided on other server machines in the existing environment. We did, however, utilize a few customized scripts to allow us to be able to alter each Linux image's TCP/IP address "on the fly" as the systems were dynamically provisioned by the management servers.

We inspected the /etc/sysinfo file and searched for the VM00 line. The third text variable on that line is the z/VM guest host name, and we can use that to determine what needs to be done to the TCPI address. Also, we made use of a z/VM v-switch definition to allow all of our Linux systems to use the same virtual network address for the OSA adapter; this also reduced the amount of custom scripting we had to do during the cloning process.

The IBM DI product has specific requirements regarding the addressing of z/VM minidisks on each of the IBM DI-related systems. This appears to be due to the design and methodology of the existing workflows for provisioning.

We used gunzip to untar and unzip the CPINT product files. This is not a required piece of software to run the IBM DI solution for MySAP, but it can be handy from time to time as it enables you to make calls to z/VM and enter CP commands and get their responses.

Sample DCM XML file

The following is an example of the DCM XML file modifications that we made for our sample installation.

```
<?xml version="1.0" encoding="UTF-8" ?>
<!DOCTYPE datacenter PUBLIC "-//Think Dynamics//DTD XML Import//EN"
    "xmlimport.dtd" [
   <!ENTITY resourcepoolconfig SYSTEM "resourcepool.xml">
   <!ENTITY dataacquisitionconfig SYSTEM "dataacquisition.xml">
   <!ENTITY simulator-cpu '
    <dae-driver device="server"
classname="com.thinkdynamics.kanaha.dataacquisitionengine.NullDriver"/>
     <dae-signal name="cpu-utilization"
        device="server" metric="cpu-utilization" aggregation="average"
        filter="low-pass-filter"/>
   '>


   <!-- =================================================== -->
   <!-- Windows SAP's                                       -->
   <!-- =================================================== -->


   <!ENTITY win-saps '
   <sap name="snmp-set" port="161" is-device-model="SNMP V1 Service Access Point"
context="write" host="true" protocol-type="ipv4" app-protocol="SNMP" locale="en_US">
     <default-sap operation-type="set-attribute"/>
     <credentials search-key="primary" is-default="true">
       <snmp-credentials community="public"/>
       </credentials>
   </sap>
   <sap name="snmp-get" port="161" is-device-model="SNMP V1 Service Access Point"
context="read" host="true" protocol-type="ipv4" app-protocol="SNMP" locale="en_US">
    <default-sap operation-type="get-attribute"/>
     <credentials search-key="primary" is-default="true">
       <snmp-credentials community="public"/>
     </credentials>
   </sap>
   <sap name="ssh service" port="22" app-protocol="SSH" is-device-model="SSH Service
Access Point" host="true"  locale="en_US">
   <default-sap operation-type="execute-command"/>
```

```
            <credentials search-key="primary" is-default="true">
               <rsa-credentials username="Administrator"/>
            </credentials>
         </sap>
         <sap name="scp client" port="22" app-protocol="SCP"  is-device-model="SSH Service
Access Point" host="false"  locale="en_US">
            <default-sap operation-type="file-transfer"/>
            <credentials search-key="primary" is-default="true">
               <rsa-credentials username="Administrator"/>
            </credentials>
         </sap>
         '>


         <!-- ======================================================= -->
         <!-- LINUX SAP's                                             -->
         <!-- ======================================================= -->

         <!ENTITY linux-saps '
         <sap name="snmp-set" port="161" is-device-model="SNMP V1 Service Access Point"
context="write" host="true" protocol-type="ipv4" app-protocol="SNMP" locale="en_US">
            <default-sap operation-type="set-attribute"/>
            <credentials search-key="primary" is-default="true">
               <snmp-credentials community="public"/>
            </credentials>
         </sap>
         <sap name="snmp-get" port="161" is-device-model="SNMP V1 Service Access Point"
context="read" host="true" protocol-type="ipv4" app-protocol="SNMP" locale="en_US">
            <default-sap operation-type="get-attribute"/>
            <credentials search-key="primary" is-default="true">
               <snmp-credentials community="public"/>
            </credentials>
         </sap>
         <sap name="ssh service" port="22" app-protocol="SSH" is-device-model="SSH Service
Access Point" host="true"  locale="en_US">
            <default-sap operation-type="execute-command"/>
            <credentials search-key="primary" is-default="true">
               <password-credentials username="root" password="itso4you"/>
            </credentials>
         </sap>
         <sap name="scp client" port="22" app-protocol="SCP"  is-device-model="SSH Service
Access Point" host="false"  locale="en_US">
            <default-sap operation-type="file-transfer"/>
            <credentials search-key="primary" is-default="true">
               <password-credentials username="root" password="itso4you"/>
            </credentials>
         </sap>
      '>


      ]>


      <!--
      <?xml version="1.0" encoding="UTF-8" ?>
      <!DOCTYPE datacenter SYSTEM "xmlimport.dtd">
      -->
      <!--
       ****************************************************************
       * Licensed Materials - Property of IBM
```

```xml
<datacenter>
   <!-- The netowrk configuration is only required to enable other required DCM
        objects which have VLAN attribute usage and to have the LAN's visable
        by the TPM/TIO GUI, there is no active VLAN manipulation by the zvm.tcdriver -->


   <!-- SWITCH FABRIC -->
   <!-- A network fabric is required for initial setup only -->
   <switch-fabric name="ITSO_zVM_Fabric"/>



   <!-- VLAN and SUBNET-->
   <!-- Administration Vlan configuration is required for initial setup only -->
   <subnetwork ipaddress="9.12.4.0" netmask="255.255.254.0">
      <!-- zVM admin VLAN zVM system 1 -->
      <vlan vlan-number="110" fabric="ITSO_zVM_Fabric"/>
   </subnetwork>

   <!-- ======================================================= -->
   <!-- The switches                                            -->
   <!-- ======================================================= -->

   <!-- Switch 1 -->
   <switch name="Switch 1" is-device-model="Dummy Switch" fabric="ITSO_zVM_Fabric"
locale="en_US">
      <switch-module name="fa0">
         <switch-port vlan="110" port-number="1" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="2" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="3" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="4" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="5" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="6" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="7" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="8" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="9" layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="10"
layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="11"
layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="12"
layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="13"
layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="14"
layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="15"
layer1-interface-type="FastEthernet"/>
         <switch-port vlan="110" port-number="16"
layer1-interface-type="FastEthernet"/>
```

```xml
            <switch-port vlan="110" port-number="17"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="18"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="19"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="20"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="21"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="22"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="23"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="24"
layer1-interface-type="FastEthernet"/>
        </switch-module>

    </switch>

    <!-- Prod-SW-1 -->
    <switch name="Prod-SW-1" is-device-model="Dummy Switch" fabric="ITSO_zVM_Fabric"
locale="en_US">
        <switch-module name="fa0">
            <switch-port vlan="110" port-number="1" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="2" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="3" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="4" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="5" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="6" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="7" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="8" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="9" layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="10"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="11"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="12"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="13"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="14"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="15"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="16"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="17"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="18"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="19"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="20"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="21"
layer1-interface-type="FastEthernet"/>
            <switch-port vlan="110" port-number="22"
layer1-interface-type="FastEthernet"/>
```

```
        <switch-port vlan="110" port-number="23"
layer1-interface-type="FastEthernet"/>
        <switch-port vlan="110" port-number="24"
layer1-interface-type="FastEthernet"/>
     </switch-module>

  </switch>


  <!-- ==================================================== -->
  <!-- The load balancer                                    -->
  <!-- ==================================================== -->
  <load-balancer name="Load Balancer 1" is-device-model="Dummy LB"
type="arrowpoint-load-balancer"  locale="en_US">
     <nic managed="false" connected-to-switch="Prod-SW-1" connected-to-module="fa0"
connected-to-port="5">
        <network-interface ipaddress="9.12.4.1.252"  netmask="255.255.254.0"
managed="false"/>
     </nic>
  </load-balancer>


  <!-- ==================================================== -->
  <!-- The load balancer VIP                                -->
  <!-- ==================================================== -->
  <virtual-ip name="HR Web" load-balancer="Load Balancer 1"
virtual-ip-address="192.168.3.250" in-tcp-port-first="80" in-tcp-port-last="80"
out-tcp-port="80" balancing-algorithm="round-robin"/>
  <virtual-ip name="Sales Web" load-balancer="Load Balancer 1"
virtual-ip-address="192.168.2.250" in-tcp-port-first="80" in-tcp-port-last="80"
out-tcp-port="80" balancing-algorithm="round-robin"/>
  -->



  <!-- BOOT SERVER -->
  <boot-server name="zVM Boot Server" is-device-model="zVM Boot Server" locale="en_US">
     <property name="ZVM Disk Pool Name" value="saplf1"/>
     <property name="ZVM System" value="9.12.4.129"/>
     <sap name="zVM vmapi" port="0" host="false" is-device-model="zVM Vmapi Service
Access Point" protocol-type="other" app-protocol="LOCAL-EXEC"
other-type-description="execute vmapi local command" locale="en_US">
        <default-sap operation-type="execute-command"/>
        <credentials search-key="zVM login" is-default="true">
          <password-credentials username="idadm" password="newpw"/>
        </credentials>
        <credentials search-key="zVM initial" is-default="false">
          <password-credentials username="idadm" password="newpw"/>
        </credentials>
     </sap>
  </boot-server>



  <!-- SW product delcaration has only placeholder purpose, the name should represent
the reality  -->
  <software name="zVM SuSE SLES Operating System" is-device-model="zVM SuSE Operating
System" version="1.0" type="OPERATING_SYSTEM" package_path="" locale="en_US">
        <property name="ZVM PingTimeoutInSeconds" component="DEPLOYMENT_ENGINE"
value="3600"/>
  </software>
```

```
    <!-- Software stack definition has bootserver dependencies -->
    <software-stack name="zVM SW Stack OS SuSE" is-device-model="zVM Image Software
Stack" is-image="true" boot-server="zVM Boot Server" locale="en_US">
        <software-stack-product product-name="zVM SuSE SLES Operating System" position="1"
expected-state="running"/>
        <property name="ZVM Prototype" component="DEPLOYMENT_ENGINE" value="LINUXVM"/>
        <property name="ZVM Master Image" component="DEPLOYMENT_ENGINE" value="sapcm 1"/>
        <property name="ZVM CloneOperationTimeoutInSeconds"
component="DEPLOYMENT_ENGINE" value="18000"/>
        <property name="ZVM VmapiOperationTimeoutInSeconds"
component="DEPLOYMENT_ENGINE" value="3600"/>
        <property name="destinationDeviceModel" component="DEPLOYMENT_ENGINE" value="zVM
SuSE Operating System"/>
        <sap name="zVM ssh" port="22" host="true" is-device-model="zVM SSH Service Access
Point" protocol-type="ipv4" app-protocol="SSH" auth-compulsory="false" locale="en_US">
            <default-sap operation-type="execute-command"/>
            <credentials search-key="zVM ssh sap" is-default="true">
               <rsa-credentials username="root"/>
            </credentials>
        </sap>
        <sap name="zVM scp" port="22" host="true" protocol-type="ipv4" app-protocol="SCP"
auth-compulsory="false" locale="en_US">
            <default-sap operation-type="file-transfer"/>
            <credentials search-key="scp" is-default="true">
               <rsa-credentials username="root"/>
            </credentials>
            <!-- use-workflow workflow-id="SCP_Copy_File" / -->
    </sap>
        <sap name="zVM ping" port="0" host="true" protocol-type="ipv4" app-protocol="SNMP"
auth-compulsory="false" locale="en_US">
            <default-sap operation-type="ping"/>
            <credentials search-key="default" is-default="true">
               <snmp-credentials community="public"/>
            </credentials>
        </sap>
    </software-stack>


    <!-- ==================================================== -->
    <!-- Server with no resource pool assignment            -->
    <!-- ==================================================== -->

    <!-- assign a local server to be used for as ssh client communication -->
    <!-- using a WINDOWS 2003 System as managing server the server name has to be full
qualified -->
    <server name="tpmsrv.itso.ibm.com" locale="en_US">
        <sap name="zVM ssh" port="0" host="false" is-device-model="zVM SSH Service Access
Point" protocol-type="ipv4" app-protocol="SSH" auth-compulsory="false">
            <default-sap operation-type="execute-command"/>
            <credentials search-key="zVM ssh sap" is-default="true">
               <rsa-credentials username="root"/>
            </credentials>
        </sap>
        <sap name="zVM scp" port="22" host="false" protocol-type="ipv4" app-protocol="SCP"
auth-compulsory="false" locale="en_US">
            <default-sap operation-type="file-transfer"/>
            <credentials search-key="scp" is-default="true">
                <rsa-credentials username="root"/>
            </credentials>
            <!-- use-workflow workflow-id="SCP_Copy_File" / -->
```

```
        </sap>
      </server>


    <!-- ==================================================== -->
    <!-- Resource Pools                                       -->
    <!-- ==================================================== -->

    <!-- TPM Server    -->
    <spare-pool name="TPM SERVER" os-type="" vlan="110" fabric="ITSO_zVM_Fabric"
locale="en_US">
        <server name="tpmsrv" locale="en_US">
          <nic managed="false" connected-to-switch="Switch 1" connected-to-module="fa0"
connected-to-port="10">
             <network-interface managed="false" ipaddress="9.12.4.78"
netmask="255.255.254.0" />
          </nic>
        &win-saps;
        </server>
    </spare-pool>

    <!-- Intel Pool    -->
    <spare-pool name="Intel Pool" os-type="" vlan="110" fabric="ITSO_zVM_Fabric"
locale="en_US">
        <server name="x330-1" locale="en_US">
          <nic managed="false" connected-to-switch="Switch 1" connected-to-module="fa0"
connected-to-port="1">
             <network-interface name="Management" ipaddress="9.12.4.251"
netmask="255.255.254.0" managed="false"/>
          </nic>
          <nic managed="true" connected-to-switch="Prod-SW-1" connected-to-module="fa0"
connected-to-port="10"/>
        </server>
    </spare-pool>

    <!-- zVM Pool    -->
    <spare-pool name="zVM Virtual Server Pool" vlan="110" os-type="linux"
fabric="ITSO_zVM_Fabric" locale="en_US">
        <!-- add servers as representation for the virtual servers capacity to the
spare-pool with name="zVM Server Pool" -->
          <server name="Server 1" is-device-model="euisap zVM Server" locale="en_US">
        <network-interface ipaddress="9.12.4.250" name="Admin" netmask="255.255.254.0"
managed="false"/>
        <nic managed="true" connected-to-switch="Prod-SW-1" connected-to-module="fa0"
connected-to-port="11"/>
          <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
      <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
          &linux-saps;
          </server>
          <server name="Server 2" is-device-model="euisap zVM Server" locale="en_US">
            <network-interface ipaddress="9.12.4.249" name="Admin"
netmask="255.255.254.0" managed="false"/>
            <nic managed="true" connected-to-switch="Prod-SW-1"
connected-to-module="fa0" connected-to-port="12"/>
            <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
          <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
```

```
            &linux-saps;
            </server>
            <server name="Server 3" is-device-model="euisap zVM Server" locale="en_US">
               <network-interface ipaddress="9.12.4.248" name="Admin"
netmask="255.255.254.0" managed="false"/>
               <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
                <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 4" is-device-model="euisap zVM Server" locale="en_US">
               <network-interface ipaddress="9.12.4.247" name="Admin"
netmask="255.255.254.0" managed="false"/>
               <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
                <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 5" is-device-model="euisap zVM Server" locale="en_US">
               <network-interface ipaddress="9.12.4.246" name="Admin"
netmask="255.255.254.0" managed="false"/>
               <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
                <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 6" is-device-model="euisap zVM Server" locale="en_US">
               <network-interface ipaddress="9.12.4.245" name="Admin"
netmask="255.255.254.0" managed="false"/>
               <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
                <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 7" is-device-model="euisap zVM Server" locale="en_US">
               <network-interface ipaddress="9.12.4.244" name="Admin"
netmask="255.255.254.0" managed="false"/>
               <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
                <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 8" is-device-model="euisap zVM Server" locale="en_US">
               <network-interface ipaddress="9.12.4.243" name="Admin"
netmask="255.255.254.0" managed="false"/>
               <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
                <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 9" is-device-model="euisap zVM Server" locale="en_US">
               <network-interface ipaddress="9.12.4.242" name="Admin"
netmask="255.255.254.0" managed="false"/>
```

```
            <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 10" is-device-model="euisap zVM Server" locale="en_US">
              <network-interface ipaddress="9.12.4.241" name="Admin"
netmask="255.255.254.0" managed="false"/>
            <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 11" is-device-model="euisap zVM Server" locale="en_US">
              <network-interface ipaddress="9.12.4.240" name="Admin"
netmask="255.255.254.0" managed="false"/>
            <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>
            <server name="Server 12" is-device-model="euisap zVM Server" locale="en_US">
              <network-interface ipaddress="9.12.4.239" name="Admin"
netmask="255.255.254.0" managed="false"/>
            <property name="zVM Related BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            <property name="zVM Referenced BootServerId" component="DEPLOYMENT_ENGINE"
value="X"/>
            &linux-saps;
            </server>

    </spare-pool>

    <!-- ===================================================== -->
    <!-- zVM Customer definition                               -->
    <!-- ===================================================== -->
    <!-- this is a sample customer for manual provisioning and test purposes -->
    <customer name="zVM Customer">

        <application name="zVM App1" priority="1" locale="en_US">
          <service-level-objective internal="false" type="min-availability"
value="0.99"/>
          <service-level-objective internal="false" type="max-response-time"
value="0.167"/>
          <cluster name="zVM Cluster App1" is-device-model="zVM Cluster" min-servers="0"
max-servers="12" pool="zVM Virtual Server Pool" fabric="ITSO_zVM_Fabric" vlan="110"
software-stack="zVM SW Stack OS SuSE" locale="en_US"/>
        </application>

        <application name="zVM App2" priority="1" locale="en_US">
          <service-level-objective internal="false" type="min-availability"
value="0.99"/>
          <service-level-objective internal="false" type="max-response-time"
value="0.167"/>
          <cluster name="zVM Cluster App2" is-device-model="zVM Cluster" min-servers="0"
max-servers="12" pool="zVM Virtual Server Pool" fabric="ITSO_zVM_Fabric" vlan="110"
software-stack="zVM SW Stack OS SuSE" locale="en_US"/>
```

```
        </application>
        <!-- add additional application for this customer here -->

    </customer>




    <!-- ==================================================== -->
    <!-- Customer definition                                  -->
    <!-- ==================================================== -->
    <customer name="SAPCustomer">

        <!-- ==================================================== -->
        <!-- Application definition: Internet Sales               -->
        <!-- Simulation ON                                        -->
        <!-- ==================================================== -->
        <application name="Internet Sales" priority="1"  locale="en_US">

            <cluster name="Sales Web Servers" min-servers="1" max-servers="9" vlan="110"
fabric="ITSO_zVM_Fabric" pool="Intel Pool" managed="true" is-device-model="Simulator"
locale="en_US">
                <with-load-balancer name="Load Balancer 1"/>
                <server name="SalesWebSrv01"  locale="en_US">
                    <nic connected-to-switch="Prod-SW-1" connected-to-module="fa0"
connected-to-port="1" managed="false">
                        <network-interface name="Local Area Connection"
ipaddress="9.12.4.240" netmask="255.255.254.0" />
                    </nic>
                &linux-saps;
                </server>
            </cluster>

            <cluster name="Sales DB Servers" min-servers="1" max-servers="2" vlan="110"
fabric="ITSO_zVM_Fabric" managed="false" is-device-model="Simulator"  locale="en_US">
                <with-load-balancer name="Load Balancer 1"/>
                <server name="SalesDBSrv01"  locale="en_US">
                    <nic connected-to-switch="Prod-SW-1" connected-to-module="fa0"
connected-to-port="2" managed="false">
                        <network-interface name="Local Area Connection"
ipaddress="9.12.4.239" netmask="255.255.254.0" />
                    </nic>
                &linux-saps;
                </server>
            </cluster>

            <objective-analyzer  type-name="TIO capacity-on-demand"/>

        </application>


    </customer>




    <!-- ==================================================== -->
    <!-- Application Topologies                               -->
```

```
    <!-- ====================================================== -->
    <application-topology>
        <requirement-name name="jdk.version"/>
        <requirement-name name="os.version"/>
        <requirement-name name="os.family"/>
        <requirement-name name="os.servicepack"/>
        <requirement-name name="database.family"/>
        <requirement-name name="database.version"/>
        <requirement-name name="hardware.memory"/>
        <requirement-name name="hardware.disk"/>
        <requirement-name name="hardware.type"/>
        <requirement-name name="servlet.version"/>
        <requirement-name name="ejb.version"/>
        <requirement-name name="vendor.name"/>
        <requirement-name name="disk.size"/>
        <requirement-name name="cpu.size"/>
        <requirement-name name="memory.size"/>
        <requirement-type name="OS"/>
        <requirement-type name="JRE"/>
        <requirement-type name="DATABASE"/>
        <requirement-type name="SERVLET_ENGINE"/>
        <requirement-type name="EJB_CONTAINER"/>
        <requirement-type name="COMMUNICATION"/>
        <requirement-type name="HARDWARE"/>
    </application-topology>


    <!-- ====================================================== -->
    <!-- System Variable                                        -->
    <!-- Make sure you know what you doing before you modify   -->
    <!-- ====================================================== -->
    <kanaha-config>
        <dcm-object id="0">
            <!-- The Send TEC Events on workflow failures is used by the
TECEventSenderBeanMDB.java and
                should always be present on all TIO systems. -->
            <property component="DEPLOYMENT_ENGINE" name="Send TEC Events on workflow
failures" value="false"/>
            <property component="RESOURCE_BROKER" name="OperationsMode-current"
value="manual"/>
            <property component="APPLICATION_CONTROLLER"
name="predictor-prediction-interval-msec" value="900001"/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.1.class"
value="com.thinkdynamics.kanaha.controller.appcontroller.predictor.DefaultPredictor"/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.1.enable"
value="true"/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.2.class"
value="com.thinkdynamics.kanaha.controller.appcontroller.predictor.LinearTrendPredictor"
/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.2.enable"
value="false"/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.3.class"
value="com.thinkdynamics.kanaha.controller.appcontroller.predictor.OneDayPredictor"/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.3.enable"
value="false"/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.4.class"
value="com.thinkdynamics.kanaha.controller.appcontroller.predictor.OneWeekPredictor"/>
            <property component="APPLICATION_CONTROLLER" name="predictor-type.4.enable"
value="false"/>
```

```
                <property component="DEPLOYMENT_ENGINE" name="PackageUtilPath"
value="/opt/zip"/>
                <property component="DEPLOYMENT_ENGINE" name="PackageScriptPath"
value="/home/thinkcontrol/script"/>
                <property component="DEPLOYMENT_ENGINE" name="PackageTempFilePath"
value="/tmp"/>
                <property component="DEPLOYMENT_ENGINE" name="PackageIntermediateHost"
value="10.1.0.1"/>
                <property component="DEPLOYMENT_ENGINE" name="PackageRepositoryHost"
value="10.1.0.4"/>
                <property component="DEPLOYMENT_ENGINE" name="PackageRepositoryDir"
value="/usr/local/kanaha/upload"/>
                <property component="DEPLOYMENT_ENGINE" name="PackageWebHost"
value="10.1.0.1"/>
                <property component="DEPLOYMENT_ENGINE" name="PackageWebDir"
value="/usr/local/kanaha/apps"/>
            &resourcepoolconfig;
            &dataacquisitionconfig;
         </dcm-object>


        <!-- ==================================================== -->
        <!-- Data Acquisition definitions for simulation          -->
        <!-- ==================================================== -->
        <dcm-object type="cluster" name="Sales Web Servers">
            <data-acquisition>
             &simulator-cpu;
           </data-acquisition>
        </dcm-object>

        <dcm-object type="cluster" name="Sales DB Servers">
            <data-acquisition>
             &simulator-cpu;
           </data-acquisition>
        </dcm-object>



    </kanaha-config>



</datacenter>
```

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

IBM Redbooks

For information on ordering these publications, see "How to get IBM Redbooks" on page 106. Note that some of the documents referenced here may be available in softcopy only.

- ► *Linux on IBM eServer zSeries and S/390: Systems Management*, SG24-6820
- ► *SAP on DB2 UDB for OS/390 and z/OS: Implementing Application Servers on Linux for zSeries*, SG24-6847
- ► *Linux on IBM eServer zSeries and S/390: Building SuSE SLES8 Systems Under z/VM* REDP-3687

Other publications

These publications are also relevant as further information sources:

- ► *SAP on DB2 UDB for OS/390 and z/OS: Planning Guide SAP Web Application Server 6.20*, SC33-7959
- ► IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Planning Version 1 Release 1 BOEE-EUIPL-00

  http://publib.boulder.ibm.com/infocenter/eserver/v1r1/en_US/info/eicax/eicax_plan.pdf

- ► IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Installation and Customization Version 1 Release 1 BOEE-EUIN-00

  http://publib.boulder.ibm.com/infocenter/eserver/v1r1/en_US/info/eicax/eicax_install.pdf

- ► IBM Dynamic Infrastructure Enterprise Edition for mySAP Business Suite Operation and Administration BOEE-EUIOP

  http://publib.boulder.ibm.com/infocenter/eserver/v1r1/en_US/info/eicax/eicax_oper.pdf

- ► *SuSE Linux EnterpriseServer8 for IBM S/390 and IBM zSeries Installation Manual*, third edition, 2004

  http://www.novell.com/documentation/suse8enterprise/pdfdoc/sles-inst-zseries.pdf

- ► *SuSE Linux EnterpriseServer8 for IBM S/390 and IBM zSeries Administration*, edition 2004

  http://www.novell.com/documentation/suse8enterprise/pdfdoc/sles-admin-zseries.pdf

- ► *SAP Software on UNIX: OS Dependencies*, Document Version 1.03, September 2004. SAP Note 580341
- ► *SAP R/3 Enterprise on UNIX: IBM DB2 Universal Database for z/OS and OS/390 Installation Guide*

  http://clustera.urz.uni-halle.de/sapdoc/install/GUIDE.HTM

- ► *IBM Tivoli Directory Server Installation and Configuration Guide Version 5.2*, SC32-1338
- ► *IBM Tivoli Directory Server Administration Guide Version 5.2*, SC32-1339

105

- ► *Tivoli Intelligent ThinkDynamic Orchestrator Installation Guide for Windows Version 2.1*, GC32-1604
- ► *Tivoli Provisioning Manager Installation Guide for Windows Version 2.1*, GC32-1641
- ► *z/VM driver for Tivoli Provisioning Manager* Readme Version 2.1.3. This driver is packaged with the Tivoli software and can be found in the %TIO_HOME%\drivers directory.

Online resources

These Web sites and URLs are also relevant as further information sources:

- ► CYGWIN was used for full support of X-Windows and sftp

  http://www.cygwin.com
- ► PuTTY was used for ssh and telnet access

  http://www.chiark.greenend.org.uk/~sgtatham/putty/
- ► SAP Java Connector

  http://service.sap.com/connectors

How to get IBM Redbooks

You can search for, view, or download Redbooks, Redpapers, Hints and Tips, draft publications and Additional materials, as well as order hardcopy Redbooks or CD-ROMs, at this Web site:

ibm.com/redbooks

Help from IBM

IBM Support and downloads

ibm.com/support

IBM Global Services

ibm.com/services

Index

A
application server   7, 10, 60, 71, 73, 79
   clone   8
   hour   74
   utilization   4

B
Business model, overview   3
Business Suite   1, 3, 7, 60
   environment   83
   Installation   40
   Login screen   33
   main screen   34
   Operation   74, 79

C
central instance   8, 49, 65, 91
COM   ix, 63, 87, 93
com   ix, 63, 98
com member   27
COM objectclass   27
configAttribute key   66
Configuration Master
   Dialog Instance   55
   Instance   53–54
createWfAttribute key   64
Cygwin 1.5.14   22

D
datacenter PUBLIC "-//Think Dynamics (DTD)   93
DB2 database
   server   40
default-sap operation-type   35, 93
deleteWfAttribute key   64
Deprovisioning, definition   2
Dexter AP   71–72
Dexter Petrol Company   1
   different divisions   71
   several departments   29
Dexter Petrol Company (DPC)   3, 5, 8, 71, 79
Dialog Instance
   Master   14
   master   14, 53, 59, 91
   master server   54
   specific file systems   54
Dialog instance   90
dialog instance   8
disk drive   41
Distributed Relational Database Architecture (DRDA)   40
DPC EMEA   4, 80

E
Enterprise Resource Planning tool (ERP)   4
Europe, Middle East & Africa (EMEA)   4

F
false   27, 94
first Linux   50
fn   26
Follow the Sun paradigm   4

G
groupOfNames   27
groupOfNames objectclass   27
groupOfUniqueNames   31
groupOfUniqueNames description   31

I
IBM DI   1, 7, 54, 59, 67, 71, 79, 87
   action   33
   actual installation   59
   application landscape   9
   component   21
   configuration master instance   16
   Configuration Master system   13
   Dialog Configuration Master   15–16
   documentation   14–15
   group   76
   GUI   29, 72
   infrastructure   1, 79
   installation   7, 60
   installation documentation   54
   Installation Guide   10
   installation manual   91
   Installer   31
   MAPE loop   73
   MAPE process   73
   package   21
   Planning Guide   9
   product   91
   related component   10
   related system   91
   Release 1   83
   Release 2   83
   role   76
   sapmnt/M5D/exe file system   91
   setup   11
   software   16
   solution   16, 72, 92
   Standard Installer   60
   successful installation   1
   system   14, 48
   user   29
   user authentication   18

IBM Dynamic Infrastructure for mySAP Business Suite on IBM zSeries

(0.2"spine)
0.17"<->0.473"
90<->249 pages

IBM ®

IBM Dynamic Infrastructure for mySAP Business Suite on IBM zSeries

Redbooks

Planning an IBM DI installation

Preparing your environment for IBM DI

Creating and examining an IBM DI Data Center Model

IBM Dynamic Infrastructure (IBM DI) for mySAP Business Suite is the new systems management software that enables clients to achieve a better balance between the demand for SAP computing resources and the supply of those resources. IDI for mySAP Business Suite helps reduce total cost of ownership and improve the quality of service in SAP solution environments, while supporting the SAP Adaptive Computing Infrastructure. IBM DI for mySAP Business Suite helps clients design and implement IBM DI for SAP solutions.

This IBM Redbook describes how to map a current infrastructure to a customized installation of IBM DI. It also provides examples of an on demand solution in a heterogeneous environment that will enable customers to run their SAP environments more efficiently.

Dynamically provisioned SAP application servers assist administrators in providing business-required accountability and Service Level Agreement (SLA0 compliance and management tools.