

# VDCF - Virtual Datacenter Cloud Framework for the Solaris™ Operating System

## Installation Guide for Solaris 11

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## 1 Introduction

This documentation describes the Virtual Datacenter Cloud Framework (VDCF) for the Solaris 11 Operating System, Version 7.2 and explains how to plan for the product, how to install it and verify that the installation was successful.

Using VDCF installed on Solaris 11, you are able to manage environments with Solaris 10 and Solaris 11 systems:

- Nodes (global zones)
- LDoms (logical domains)
- vServer (non-global zones)

See these other documents for further information:

<i>VDCF – Release Notes</i>	for details about the new release
<i>VDCF – Quick Reference</i>	for a short command overview
<i>VDCF – Installation Solaris 10</i>	for VDCF installation on Solaris 10
<i>VDCF – Proxy</i>	for information about running VDCF using Proxies
<i>VDCF – Administration Guide</i>	for information about VDCF Usage
<i>VDCF – Resource Management</i>	for information about VDCF Resource Management
<i>VDCF – Monitoring</i>	for information about VDCF Monitoring (HW, Resource, OS)

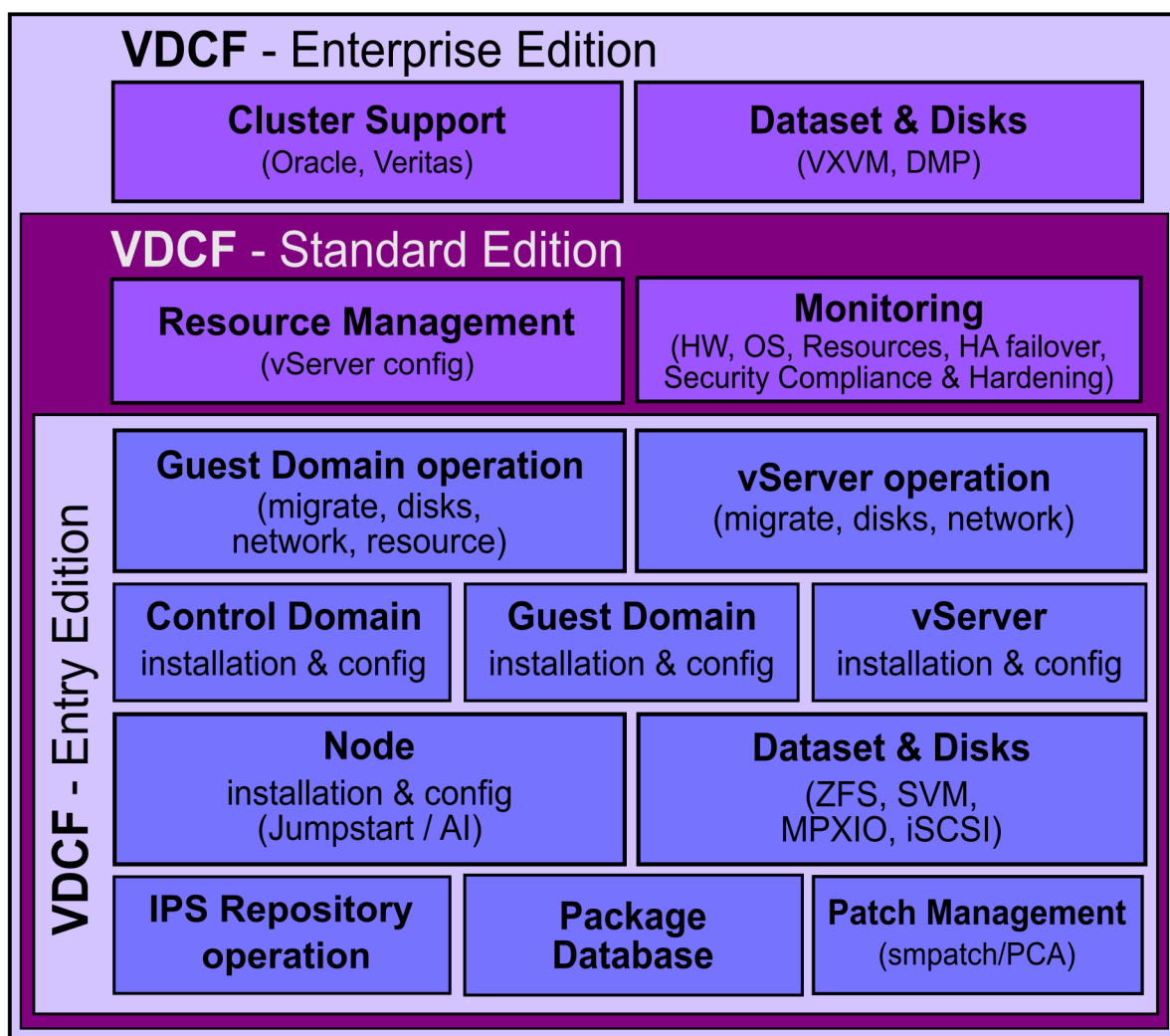
These and all other VDCF documents can be found at:

<https://www.jomasoft.ch/vdcf/#js-docu>

## 1.1 Overview

VDCF is a platform management framework for the Solaris Operating System. VDCF allows you to run a virtualized data center using Solaris 10 and 11 Containers and/or Logical Domains controlled by a centralized management server.

With VDCF, JomaSoft offers a tool to simply and effectively operate your Solaris based virtual data center. On a central management server you create definitions and configuration, which are stored in the Configuration Repository. This information is then used by VDCF to populate physical servers with a Solaris build from which virtual servers or logical domains are created.



VDCF is installed in the Global Zone of a Solaris 11 Server. From this server you install and operate your physical servers (Nodes / Control Domains), Guest Domains and your virtual servers (Containers/Zones).

## 1.2 Supported Environments

Currently the following System Environments are supported:

- Management Server      Oracle SPARC Server and x86 Server  
                                 Fujitsu SPARC M10 and M12 Server  
                                 Solaris 11.1, 11.2, 11.3 and 11.4
- Compute Node/Server      Oracle SPARC Server and x86 Server  
                                 Fujitsu SPARC M10 and M12 Server
- Solaris Operating System      Solaris 10 Update 7 (5/09) up to Update 11 (1/13)  
                                 Solaris 11.1, 11.2, 11.3 and 11.4
- Logical Domains      LDoms 1.1/1.2/1.3/2.0/2.1/2.2/3.0/3.1/3.2/3.3/3.4/3.5/3.6
- Branded Zones      solaris8, solaris9, solaris10
- Volume Manager      ZFS, Solaris Volume Manager (SVM)
- Filesystem      ZFS, Solaris UFS, lofs
- SAN / iSCSI      Storage and HBA's compatible to  
                                 SUN StorEdge SAN 4.4.x / Multipathing using STMS/MPXIO  
                                 iSCSI Targets compatible to Solaris iSCSI Initiator
- Terminal Server      Blackbox, Cyclades, IOLAN
- System Controller      ILOM, XSCF, SC/ALOM, RSC, SSC, 15K, ALOMCMT, ILOMx86
- Network      Link aggregation, IPMP and tagged VLAN for LDoms and vServer  
                                 vServer exclusive ip-stack

For VDCF Standard & Enterprise customers the following Extensions are available:

- Resource Management      Administration of vServer Resource settings
- Monitoring      Hardware, Resource, OS Monitoring, HA/Automated Failover

For VDCF Enterprise customers the following Extensions are available:

- Veritas Dataset      Volume Manager: VXVM, Filesystem: vxfs
- Sun/Solaris Cluster      Integration of vServers in Sun Cluster  
                                 Integration of LDoms/GDoms in Solaris Cluster
- Veritas Cluster      Integration of vServers in Veritas Cluster

Other environments may only need small enhancements. Send us your request !

## 2 Installation

### 2.1 Prerequisites

#### 2.1.1 Management Server & Solaris

The Management Server must be installed using Solaris 11 with at least the “small-server” Software Group (large-server is recommended). VDCF requires additional packages, which will be installed automatically by the vdcf\_install tool.

```
-bash-4.1$ pkg list group/system/solaris-*  
NAME (PUBLISHER)          VERSION                                IFO  
group/system/solaris-core-platform  0.5.11-0.175.3.0.0.30.0             i--  
group/system/solaris-small-server   0.5.11-0.175.3.1.0.5.0             i--
```

Typically the VDCF framework is installed in the global zone. It is also supported to install VDCF in a non-global zone: See Appendix 4.2 (Installing VDCF in a non-global zone) for details and limitations.

Disk space for VDCF	
50 MB free space in /opt/	to install the VDCF framework
10 GB free space in /var/opt	where VDCF stores its data

Disk space for Builds	
40 GB free space in /export	to store flash archives (for Solaris 10 nodes)
40 GB free space in /ips	to store IPS repositories and AI services (for Solaris 11 nodes)

#### 2.1.2 Network

A dedicated „Management Network“ is required, which connects the Management Server to the Compute Server and their system controllers.

## 2.2 Installing the VDCF Framework

### 2.2.1 Overview

The VDCF framework is installed into `/opt/jomasoft/vdcf`.

The framework itself consists of the following software packages:

a) Installed on the management server

- VDCF Base Components
  - JSvdcf-base - JomaSoft VDCF Base Framework  
Includes Features for Patching, LDoms and vServers/Zones

For Standard and Enterprise customers the following Packages are additionally installed

- JSvdcf-rm - JomaSoft VDCF Resource Management
- JSvdcf-monitor - JomaSoft VDCF Hardware, Resource, OS Monitoring,  
Security Compliance, Hardening and Dashboard

b) Installed on the compute servers

This client package is installed automatically by the framework when installing a new compute node:

- JSvdcf-client - JomaSoft VDCF Client

### c) Directories

When installing the base framework for the first time, the required directories and the configuration repository are initialized. The required ssh key is generated for the root User. The ssh key is used for ssh connections from the management server to the compute server, when initiating "Remote Execution".

<code>/export/install/flash</code>	This is the default directory where the installation configuration and the flash archives (builds) for the Solaris 10 nodes are stored. This directory will be visible through a web server. This directory is managed through the VDCF framework commands.
<code>/ips/service</code>	The default directory where the AI install services for Solaris 11 nodes are stored. This directory contains the boot image and the install server log files. AI install services are managed through the VDCF framework command <code>ipsadm</code> .
<code>/ips/repo</code>	The default directory where Solaris 11 IPS repositories are stored. IPS repositories are managed through the VDCF framework command <code>ipsadm</code> . We recommend to setup at least two repositories. One for production use (install and update servers) and another one for testing of new Solaris SRUs.
<code>/var/share/jomasoft</code>	This directory contains the configuration data for VDCF and is linked to <code>/var/opt/jomasoft</code> . Files under <code>/var/share</code> are not part of the boot environment snapshot when upgrading Solaris 11.1
<code>/var/opt/jomasoft/vdcf/db</code>	This directory contains the configuration repository. It's recommended to backup this directory regularly.
<code>/var/opt/jomasoft/vdcf/conf</code>	various configuration files, like <code>customize.cfg</code> , partitioning, build profile, etc
<code>/var/opt/jomasoft/vdcf/config</code>	This directory contains the additional packages, custom scripts and files . used when installing a node or vServer. This directory is managed by the system administrator.
<code>/var/opt/jomasoft/vdcf/log</code>	The framework is logging into this directory



## 2.2.2 Download and Installation

VDCF can be downloaded as bundles. Based on your License you download the Free Edition, Entry, Standard or Enterprise bundle. Each bundle contains the packages you are entitled to.

```
$ tar xzf vdcf_enterprise_7.2.0_sparc.tar.gz
```

### Installing the VDCF packages

```
# ./vdcf_bundle/vdcf_install

Checking VDCF Prerequisites ...
Missing required Solaris 11 Package web/server/apache-24
Missing required Solaris 11 Package install/installadm
Missing required Solaris 11 Package shell/expect
Trying to install ...
pkg install web/server/apache-24 install/installadm shell/expect

Adding packages ...
JSvdcf-base           ... done
JSvdcf-rm             ... done
JSvdcf-monitor        ... done

VDCF Install successful.

Check /var/tmp/vdcf_install.log for details.
```

## 2.3 Upgrading the VDCF Framework

The file name to use depends on your VDCF license.

```
$ tar xzf vdcf_enterprise_7.2.0_sparc.tar.gz
```

Run the upgrade as root:

```
# ./vdcf_bundle/vdcf_upgrade
```

VDCF Package Overview (vdcf / 25.03.2019 07:04:11)

Package	Installed	Available	Upgrade
SMCsqlite	3.7.2	3.7.2	NOT REQUIRED ANYMORE
JSvdcf-base	5.5.4	7.2.0	YES
JSvdcf-patch	5.5.4	-	REMOVE
JSvdcf-vserver	5.5.4	-	REMOVE
JSvdcf-ldom	5.5.4	-	REMOVE
JSvdcf-monitor	2.3.6	3.1.0	YES
JSvdcf-rm	3.2.8	3.4.0	YES

Execute VDCF Upgrade (Y/N)? Y

Removing packages ...

```
JSvdcf-rm      ... done
JSvdcf-monitor ... done
JSvdcf-ldom    ... done
JSvdcf-vserver ... done
JSvdcf-patch   ... done
JSvdcf-base    ... done
```

Adding packages ...

```
JSvdcf-base    ... done
JSvdcf-monitor ... done
JSvdcf-rm      ... done
```

VDCF Upgrade successful.

Check /var/tmp/vdcf\_upgrade.log for details.

TODO: Upgrade your Nodes using: vdcfadm -c update\_node all

In previous VDCF Versions the package SMCsqlite was required. Starting with VDCF Version 6.0 sqlite is delivered as part of the JSvdcf-base package. The previously required SMC Packages can be removed.

## 2.4 Configuring the VDCF Framework

After installing the VDCF framework, some configuration and integration into your system environment is required.

You can configure the framework automatically using the provided setup script.

### 2.4.1 Automatically setup framework with setup\_vdcf

A good starting point is the use of the setup script to configure initial settings for the framework. This includes the web server configuration and the needed variables in the configuration (chapter 3.1.1). If you use the setup script, manually configuration steps for apache should not be needed afterwards, except there are special requirements needed.

Run the script as root:

```
root@vdcf$ /opt/jomasoft/vdcf/mods/setup/setup_vdcf -a

Gathering information...
Getting password hash from /etc/shadow of user root
Looking for hosts management IP address
Modifying /var/opt/jomasoft/vdcf/conf/customize.cfg ...
Creating backup file as /var/opt/jomasoft/vdcf/conf/customize.cfg_2013.09.03-15.38.04
Setting FLASHPWD to 'TI0G9i/hL43nU'
Setting AI_ADMINPWD to 'TI0G9i/hL43nU'
Setting FLASH_BOOTSERVER_IP to "192.168.20.34"
Setting FLASH_WEBSERVER_URL to "http://192.168.20.34"
Setting FLASH_PUBLIC_WEBSERVER_URL to "http://192.168.20.34"
Setting WEBSEVER_URLS to "192.168.20.0;http://192.168.20.34
default;http://192.168.20.34"
Setting CONFIG_NETMASK_DEFAULT to
"DEFAULT:255.255.255.0,MNGT:255.255.255.0,PUBL:255.255.255.0,BACK:255.255.255
.0"
Setting PATCH_SOURCE_URL to "http://192.168.20.34:3816"
Modifications in /var/opt/jomasoft/vdcf/conf/customize.cfg done.
Configuring apache web server...
VDCF config file /etc/apache2/2.4/conf.d/vdcf.conf not found, creating
Enabling SMF apache24
Apache web server configuration done.
Finished configuration of VDCF environment..
```

If you have more than one network interface configured on the system, you have to specify the management interfaces ip address on the command line with '-i <mngt\_ip>'.

#### Apache

A vdcf.conf file is automatically created: /etc/apache2/2.2/conf.d/vdcf.conf

On Solaris 11.4 Apache 2.4 is used: /etc/apache2/2.4/conf.d/vdcf.conf

By default this generated vdcf.conf file allows connection from the same subnet, as the VDCF management server is using. For Apache 2.2 add additional subnets using the "Allow" clause

```
Allow from 192.168.40.0/24
```

For Apache 2.4 use the new Syntax:

```
Require ip 192.168.40.0/24
```

## 2.4.2 RBAC and Users

VDCF provides the following RBAC profiles, which must be configured for your administration staff.

VDCF Logger	required for all users, to be able to log framework messages
VDCF admin Module	vdcf administration
VDCF install Module	node installation
VDCF node Module	node operations
VDCF config Module	node and vServer customization
VDCF disks Module	disk management
VDCF dataset Module	dataset management
VDCF virtual Module	vServer management and operations
VDCF ldom Module	ldom management and operation
VDCF patches Module	patch management for nodes, guest domains and vServers
VDCF computepool Manager	computepool management
VDCF computepool User	computepool display
VDCF vpool Manager	virtualpool management
VDCF vpool User	virtualpool display
VDCF serverconfig exec	serverconfig execution
VDCF pkg Module	package management
VDCF readonly	All read only modules (No update functions included)

Add the Profile entries to `/etc/user_attr` for your administrators. All users with the above RBAC Profiles are allowed to execute the VDCF commands found in `/opt/jomasoft/vdcf/bin`.

Sample entry from `/opt/jomasoft/vdcf/conf/sysconf/etc_user_attr`

```
marcel::::type=normal;profiles=VDCF Logger,VDCF admin Module,VDCF install \
Module,VDCF node Module,VDCF config Module,VDCF disks Module,VDCF dataset \
Module,VDCF virtual Module,VDCF patches Module,VDCF computepool Manager,VDCF \
ldom Module,VDCF vpool Manager,VDCF pkg Module
```

If you would like to create a VDCF administration user, use the following command

```
useradd -d /export/home/vdcf -m -s /bin/bash -P "VDCF Logger,VDCF admin \
Module,VDCF install Module,VDCF node Module,VDCF config Module,VDCF disks \
Module,VDCF dataset Module,VDCF virtual Module,VDCF patches Module,VDCF \
computepool Manager,VDCF ldom Module,VDCF vpool Manager,VDCF pkg Module" vdcf
```

## 2.4.3 Admin Environment

Add the following directories to you shell profile

PATH	/opt/jomasoft/vdcf/bin	VDCF commands
MANPATH	/opt/jomasoft/vdcf/man	VDCF manpages

Sample entry:

```
export PATH=/opt/jomasoft/vdcf/bin:$PATH
export MANPATH=/opt/jomasoft/vdcf/man:$MANPATH
```

## 3 Customize the VDCF Framework

### 3.1 Configuration files

#### 3.1.1 customize.cfg

There is one main VDCF configuration file: `/var/opt/jomasoft/vdcf/conf/customize.cfg`

If you have used the setup script described in chapter 2.4.1 these variables should already be set with correct values. Otherwise you have to set at least all these variables:

```
export FLASHPWD=''
    Here you store the root password set after a node or vServer is installed.
    Password must be in shadow format.

export FLASH_WEBSEVER_URL="http://10.1.1.1:80"
    Default URL of the configured web server. This URL is used on nodes and vServers
    to get the system configuration and flash archive.

export FLASH_PUBLIC_WEBSEVER_URL="http://192.168.0.1:80"
    Alternate URL of the configured web server. This URL is required if the target node is in
    another network than the management server is. This URL is used on nodes and vServers
    to get the system configuration and flash archive.

export FLASH_BOOTSERVER_IP="10.1.1.1"
    IP address of your management server

export WEBSERVER_URLS="192.168.0.0;http://192.168.0.1:80 default;http://10.1.1.1:80"
    Add URLs of the configured web server. format: "network:url network:url default:url"
    The default setting is required. Additional networks are optional.

export CONFIG_NETMASK_DEFAULT="DEFAULT:255.255.255.0,MNGT:255.255.255.0,..."
    Defines default values for the 'netmask' argument used at vserver -c addnet and
    nodecfg -c add

export PATCH_SOURCE_URL="http://10.1.1.1:3816"
    URL of your Solaris 10 patch server, usually installed on the VDCF management server

export AI_ADMINPWD=''
    Password of admin user. Password must be in shadow format.
```

The following variables need at least to be modified to suit your needs, even if used the setup script:

```
export NODE_NET_ALIAS="MNGT:AUTO,PUBL:AUTO,BACK:AUTO,PROBE:AUTO"
    Defines the default speed set when configuring new nodes using the nodecfg command.
    Allowed speed settings are: AUTO,1000fdx,1000hdx,100fdx,100hdx

export CONFIG_DEFAULTS="server.group=node;server.location=RZ"
    Defines default values used when configuring new nodes using the nodecfg -c add
    command. server.group defines the default configuration groups and server.location
    defines the default location of a node.
```

```
export SOL11_SUPPORT_CERT=<path to cert>
    File path to your Solaris 11 Support Certificate (used for IPS repository update)

export SOL11_SUPPORT_KEY=<path to key>
    File path to your Solaris 11 Support Key (used for IPS repository update)

export AI_ADMINUSER='admin'
    Name of admin user created by AI while installing a Node/vServer.
```

### 3.1.2 Node partitioning (Solaris 10)

Node partitioning is configured as a Jumpstart profile. You may modify the default values in `/var/opt/jomasoft/vdcf/conf/partitioning.cfg`

For server specific partitioning, for example for older hardware with small disks, you can create a partitioning configuration file per node. The file name has the following format :

```
/var/opt/jomasoft/vdcf/conf/<nodename>_partitioning.cfg
```

### 3.1.3 Disk locations

To let VDCF know the locations of your data centers and storage systems you should add the qualifiers of your disk GUIDs to `/var/opt/jomasoft/vdcf/conf/disklocation.cfg`. You may use the template file `disklocation_template.cfg` as base.

More details can be found in Chapter 4.7.4 “Physical disk location” in the VDCF Administration Guide.

## 3.2 Cronjob

VDCF provides a few prepared crontab entries

```
-bash-4.1$ more /opt/jomasoft/vdcf/conf/sysconf/vdcf_base_crontab
#
# $Id: vdcf_base_crontab,v 1.8 2018/08/22 14:15:26 mech Exp $
#
# add the entries to the root crontab on
# your management server
#
# JSvdcf-base cron
0,15,30,45 * * * * /opt/jomasoft/vdcf/sbin/repos_update -q >/dev/null 2>&1
0 2 * * * /opt/jomasoft/vdcf/sbin/vpkgadm_nightly >/dev/null 2>&1
0 0 1 * * /opt/jomasoft/vdcf/sbin/diskusage_update -F -q >/dev/null 2>&1
15 21 0 * * /opt/jomasoft/vdcf/mods/config/console_check >/dev/null 2>&1
# JSvdcf-base cron
```

It is highly recommended to activate this 3 entries

### 3.2.1 Runtime States

The Runtime States (rState) of Nodes and vServers are updated in the VDCF configuration repository using a cronjob. It is recommended to run the cronjob regularly.

```
0,15,30,45 * * * * /opt/jomasoft/vdcf/sbin/repos_update -q >/dev/null 2>&1
```

### 3.2.2 Package Database

The Package Database should be updated once a day using the following entry

```
0 2 * * * /opt/jomasoft/vdcf/sbin/vpkgadm_nightly >/dev/null 2>&1
```

### 3.2.3 Physical Node Console (System Controller)

Check the connection to the System Controllers once a week. This will also update the VDCF repository after firmware updates.

```
15 21 0 * * /opt/jomasoft/vdcf/mods/config/console_check >/dev/null 2>&1
```

### 3.3 System configuration

In VDCF terminology Nodes, Guest domains and vServers are configured using Base and Server configuration. This information is stored in the configuration repository using these two VDCF commands:

- `config` (used for base configuration)
- `serverconfig` (used for server configuration)

Base configuration contain the effective system configuration values, for example DNS server ip addresses. In Server configuration you assign the Base configuration to nodes, vServers or server groups. A base configuration without a server configuration is useless and makes no sense. Only configuration data mapped to a server (or a group of server) is applied at installation time!

This chapter describes the required and recommended Base configuration. Check the VDCF Administration Guide and the manpages of “`config`” and “`serverconfig`” for detailed information about system configuration.

The file `/opt/jomasoft/vdcf/conf/sysconf/vdcf_system_configs` contains the recommended commands and templates for the mentioned commands below.

#### 3.3.1 Required configuration

##### a) SCSI\_VHCI

For non-Sun SAN storage, it is required to register the provider SCSI product id. Use the Solaris format command “`inquiry`” to display the provider and productid.

For example for an IBM storage:

```
config -c add type=SCSI_VHCI name=DS8300 provider=IBM productid=2107900
serverconfig -c add type=SCSI_VHCI name=DS8300 group=IBM
```

##### b) SVM Solaris Volume Manager required services (Solaris 10)

For SVM to work properly the following 3 SMF Services must be enabled on all Nodes.

```
config -c add type=SERVICES name=SVM enable=metainit,mdmonitor,meta
serverconfig -c add group=node type=SERVICES name=SVM
```

##### c) Defaultroute per Network

Add the Defaultroute's of your subnets. Replace 'YOURNET' with unique names to identify your networks.

```
config -c add type=DEFAULTROUTE name=YOURNET ipaddr=10.10.1.1
serverconfig -c add group=<yourgroup> type=DEFAULTROUTE name=YOURNET
```

Use the configuration group <yourgroup> when adding a new node running in this network with `nodecfg -c add`.

##### d) DNS

```
config -c add type=DNS name=PROD server=192.168.0.1,192.168.0.2 \
domain=yourdomain.com search=yourdomain.com
```

```
serverconfig -c add type=DNS name=PROD
```



### 3.3.2 Recommended configuration

The following commands are not required for VDCF, but their use is recommended.

#### a) Disable insecure SMF services

Here is a sample command for disabling some 'unwanted' SMF services.

```
config -c add type=SERVICES name=HARDENING \
disable=telnet,sendmail,print/server,rstat

serverconfig -c add type=SERVICES name=HARDENING
```

#### b) NTP time services

If NTP is used in your environment replace ntp1 and ntp2 with your NTP timeservers.

```
config -c add type=NTP name=PROD server=ntp1,ntp2
serverconfig -c add type=NTP name=PROD
```

#### c) Users

It is recommended to add the administration users after installing a system.

With VDCF you do this using a script which must be stored in  
/var/opt/jomasoft/vdcf/config/script

Sample Script:

```
#!/bin/ksh

# Script: add_users
# Usage: Adds admin users

add_user() {
    typeset username=$1

    # add user, if not already defined
    if ! grep "^$username:" /etc/passwd >/dev/null; then
        useradd -d /export/home/$username -s /bin/bash -m $username
        passwd -df $username
    fi

    if [[ "$(uname -r)" = 5.11 ]]; then
        echo "Solaris 11, add role root to user: $username"
        /usr/sbin/usermod -R +root $username
    fi
}

add_user yourname

config -c add type=SCRIPT name=USERS script=add_users
serverconfig -c add type=SCRIPT name=USERS
```

## 3.4 Next Steps

The VDCF framework is now configured and ready to use.

The following steps are documented in the VDCF Administration Guide:

### 3.4.1 Prepare Environments for installing Nodes

#### Solaris 11: IPS Repository and AI Service

- Setup the IPS package Repository (ipsadm command)
- Setup the AI installation service (ipsadm command)
- Define the Build (ipsadm command)
- Enable the node with a build and install it (node command)

#### Solaris 10: Produce a build (Flash Archive)

- Configure a Build (flash archive) to install using the build command
- Discover and add a node to the VDCF configuration repository (nodecfg command)
- Enable the Build to be installed on the target node (flash command)
- Install the node (node command)

### 3.4.2 Deploy vServers

- Configure Datasets and vServers (dataset and vservers command)
- Install the vServer (vservers command)

### 3.4.3 Build a Control domain and deploy Guest Domains

- Setup control domain (cdom command)
- Install a guest domain (gdom command)

## 4 Appendixes

### 4.1 Firewall Rules

If your system environment contains firewalls you may have to define firewall rules. These rules are required for a correct execution of VDCF:

a) Firewall rules between Management Server and Target Nodes or Guest Domains

VDCF Management Server	Direction	Targets (Nodes, GDomS)	Comment
	→	ssh (port 22)	Required for Remote Command Execution
	→	System Controller	Depending on type of System Controller (telnet or ssh)
	→	icmp ping	Check for availability (optional)
WebServer (port 80)	←		Web server port (can be changed)
Patch Proxy (port 3816)	←	Solaris 10 only	Port of patch proxy (optional)
JomaSoft IPS repository (port 8281)	←	Solaris 11 only	JomaSoft Repository is only used at installation time.
Solaris IPS repositories (port 8282 ff)	←	Solaris 11 only	Solaris Repositories are used for installation and upgrade. You may have multiple repositories (ports)
Solaris AI service (port 5555)	←	Solaris 11 only	Used at installation time

The following rules are additionally required if you install X86 Nodes (using PXE)

VDCF Management Server	Direction	Targets	Comment
tftp (udp 69)	←	Node	PXE Boot / Jumpstart to transfer kernel
NFS (port 2049)	←	Node	Solaris Jumpstart

b) Firewall rules between Management Server and vServers

VDCF Management Server	Direction	Targets (nodes, domains, vServers)	Comment
	→	ssh (port 22)	Required for Remote Command Execution
WebServer (port 80)	←		Web server port (can be changed)

c) Firewall Rules and/or Internet Proxy Settings between Management Server and Internet

These rules are required to connect to the Oracle Solaris IPS repository (for Solaris 11):

VDCF Management Server	Direction	Internet Server
	→	pkg.oracle.com – https (port 443)

The following rules are additionally required if you are using pca to download Solaris 10 patches (PATCH\_DOWNLOAD\_TYPE is set to PCA)

VDCF Management Server	Direction	Internet Server
	→	login.oracle.com - https (port 443)
	→	getupdates.oracle.com - https (port 443)
	→	aru-akam.oracle.com - http (Port 80)

d) Firewall rules between Control Domains for Guest Domain Live Migration

Source Guest Domain	Direction	Targets Guest Domain	Comment
	→	Port 8101	LDom Migration Service
	→	Port 6482	XMPP Support

## 4.2 Installing VDCF in a non-global zone

### Global Zone – Engineering Environment

The VDCF framework must be installed in the global zone. VDCF uses Jumpstart technologies and protocols, which are not supported in a non-global zone. Use the VDCF framework in the global zone as the Engineering environment where you create BootServer environments, install Nodes using a build.profile and produce Flash archives to define Builds.

### Non-Global Zone – Deployment Environment

VDCF is installable in a non-global zone and as a deployment environment for **sparc** systems using the **WANBoot** technology. In such a deployed environment you define Builds based on the BootServer environments and archives created in the Engineering environment.

### Requirements

You must create a zone, ideally use VDCF on the global zone to create the VDCF non-global zone.

```
zonecfg -z vdcf1  
create
```

Add the following devices to the zone configuration. This is required because VDCF uses lofiadm to maintain the WANBoot images.

```
set fs-allowed=ufs
```

Don't forget to mark the disks used by this zone as 'FOREIGN' in the VDCF deployment environment! Or you may import the vServer information into the VDCF deployment environment. Ask JomaSoft Support for help about this task.

#### 4.2.1 VDCF Management vServer Failover

If VDCF is installed in a non-global zone it makes sense to facilitate the failover to another spare node. You may use the script `vserver_local` on the source and target Node to easily migrate the VDCF management vServer.

##### Requirements

a) VDCF base package must be installed on all potential target Nodes. Keep all VDCF installations on the same level.

b) Add the vServers dataset and zones base directory information into the config file  
`/var/opt/jomasoft/vdcf/conf/vserver_local.cfg`

You may find a template of that config file in `/opt/jomasoft/vdcf/conf/vserver_local.cfg`. Copy this file to all planned VDCF management source and target nodes.

##### Usage

a) If the source node is still active and running: use the detach option of the `vserver_local` tool:  
`/opt/jomasoft/vdcf/tools/vserver_local -d <mgmt vServer name>`

b) On the target node use the attach option:  
`/opt/jomasoft/vdcf/tools/vserver_local -a <mgmt vServer name>`

**Caution:** Please be aware that the attach function is using import force to attach the datasets. You should use it only if you are sure that the datasets aren't in use on other nodes!

### 4.3 VDCF uses the following Free and OpenSource Software (FOSS)

#### Django 1.11.5

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#### VirtualEnv 15.1.0

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#### pexpect 4.2.1

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#### Bootstrap 3.3.7

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jQuery 2.2.4

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DataTables 1.10.15

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