KnapSac provides two ways to backup a VMS system disk so that the system disk can be fully restored:

1.   **Network Backup/Restore**

        In the network approach KnapSac is used to create an image save of the system disk and store it in a pacset on a Windows computer.

        In order to restore the system disk from the pacset on the Windows computer, VMS is booted from an alternate disk which has KnapSac and TCP/IP networking. Then KnapSac is used to restore the system disk from the image pacset created on Windows.

2.   **Local Backup/Restore**

        In the local approach KnapSac is used to create an image save of the system disk and place it in a self-restoring pacset on a local disk other than the system disk.

        In order to restore the system disk from the self-restoring pacset, a minimum VMS system is booted from the VMS distribution DVD or from a minimum system that has been created on an alternate disk. After VMS is booted the self-restoring pacset is run to restore the system disk.

Example Network Backup/Restore

1.   Use KnapSac to perform an image save of the system disk dka0: to a pacset on Windows.

        $knapsac dka0: winpc::dka0img.pac /image

2.   If the system disk fails it can be restore by booting VMS from another disk on the same VMS system or move the target system disk to another VMS system which also has KnapSac. Then use KnapSac to perform an image restore to the target system disk. Assuming dka0: is the target disk the following commands will restore the system disk.

        $ init dka0: system   ! (if a new disk)
        $ mount /foreign dka0:   ! mount the target disk /foreign
        $ knapsac winpc::dka0img.pac dka0: /image   ! restore the system disk

        After the system disk has been restored, run the system boot options command procedure to set a new boot option for the restored system disk. Then the restored disk

can be booted. The disk dka0: can then be booted or moved back to the original system and booted.

Example Local Backup/Restore

1. Use KnapSac to perform an image save of the system disk dka0: and place it in a self-restoring pacset on a different disk such as dka100:.

    $ knapsac dka0: dka100:[ksbackup]dka0imgse.pac /system/image

    The /system qualifier tells KnapSac to create a self-restoring pacset and the /image qualifier tells KnapSac to make an image save of the disk.

2. If the system disk fails it can be restored by booting a minimum VMS system from the VMS distribution DVD or an alternate disk. Choose the DCL commands option to get to the $$$ prompt. Mount the disk which contains the pacset and define a foreign command for the pacset.

    ```
    $$$ mount/over=id dka100:                          ! mount the pacset disk
    $$$ kspacset := $dka100:[ksbackup]dka0imgse.pac    ! define the foreign command
    $$$ init dka0: system                              ! (if a new disk)
    $$$ mount/foreign dka0:                            ! mount the new disk /foreign
    $$$ kspacset restore dka0: /image                  ! restore the system disk
    ```

    After the system disk has been restored, run the system boot options command procedure to set a new boot option item for the restored system disk. Then the restored disk can be booted.

Detailed Example of Local Backup/Restore

An Integrity computer has the following disks:

DKA0:   User disk
DKA100:   User disk
DKB200:   System disk

This example illustrates the following steps:

A.   Use KnapSac to perform an image backup of the system disk DKB200: and store it in the pacset DKB200IMG.PAC in the directory DKA100:[KSBACKUP].
B.   Boot the VMS distribution DVD and choose the DCL commands option.
C.   Use KnapSac to restore the system disk DKB200: from the pacset that was stored on the user disk DKA100:
D.   Use the VMS boot_options command file to remove the previous boot option entry for the previous system disk.
E.   Use the setboot command to write a new boot block on the restored system disk DKB200:.
F.   Use the VMS boot_options command file to set a new boot option entry for the restored system disk.
G.   Shutdown the minimum VMS system and then boot the restored system disk.

Creating the KnapSac self-restoring pacset

KnapSac version 2.3-0 provides the /system qualifier to create a self-restoring pacset on a local disk instead of creating a pacset on a Windows disk. An image save of the system disk can be accomplished by using the /system qualifier conbined with the /image qualifier.

```
$ create/dir dka100:[ksbackup]                                    ; create a directory for the pacset
$ set def [ksbackup]
$ knapsac dkb200: dka100:[ksbackup]dkb200img.pac /system/image          ; save the system image
%KNAPSAC-I-VERSION, KnapSac IA64 Version 2.3-0 Level D starting on  7-NOV-2011 1
3:04:56.91
%KNAPSAC-I-NOBACKUP, [SYS0.SYSEXE]PAGEFILE.SYS;1 marked NOBACKUP, data not saved
%KNAPSAC-I-NOBACKUP, [SYS0.SYSEXE]SWAPFILE.SYS;1 marked NOBACKUP, data not saved
%KNAPSAC-I-NOBACKUP, [SYS0.SYSEXE]SYS$ERRLOG.DMP;2 marked NOBACKUP, data not sav
ed
%KNAPSAC-I-NOBACKUP, [SYS0.SYSEXE]SYS$ERRLOG.DMP;1 marked NOBACKUP, data not sav
ed
%KNAPSAC-I-NOBACKUP, [SYS0.SYSEXE]SYSDUMP.DMP;1 marked NOBACKUP, data not saved
%KNAPSAC-I-LOST_FILES, Processing lost files at 14:27:28.93
```

%KNAPSAC-I-FILE, Created DKA100:[KSBACKUP]DKB200IMG.PAC;1 at 14:27:29.00 from DKB200:

              KnapSac Statistics

Elapsed Time: 01:22:32.11   CPU Time: 0:13:49.79
Buffered I/O: 161799   Direct I/O: 1322585

48229476 blocks (9964 input files) compressed to 18148865 blocks

30080611 blocks saved (62.4 percent reduction)
$

Booting from the VMS distribution DVD

Boot VMS from the VMS distribution DVD by selecting the DVD-ROM boot option from the EFI Boot Manager menu.

EFI Boot Manager ver 1.10 [14.61] Firmware ver 2.31 [4411]

Please select a boot option

   VMS83
   VMS82
   HP-UX Primary Boot: 0/1/1/0.0.0
   VMS84 PKB0.2
   EFI Shell [Built-in]
   DVD-ROM
   Boot Option Maintenance Menu
   System Configuration Menu

   Use ^ and v to change option(s). Use Enter to select an option
Loading.: DVD-ROM
Starting: DVD-ROM

   HP OpenVMS Industry Standard 64 Operating System, Version V8.4
   © Copyright 1976-2010 Hewlett-Packard Development Company, L.P.

   Installing required known files...

   Configuring devices...

%EIA0, Auto-negotiation mode assumed set by console
%EIA0, Auto-negotiation started, advertising 100BaseTX Full Duplex, Flow Control

```
%EIA0, Full Duplex 100BaseTX connection selected, RX+TX flow control
%EWA0, Auto-negotiation mode assumed set by console
%EWA0, BCM5701 located in 64-bit, 66-mhz PCI slot
%EWA0, Device type is BCM5701C (UTP) Rev B5 (01050000)
%EWA0, Link up: 1000 mbit, full duplex, flow control (txrx)



    *****************************************************************

    You can install or upgrade the OpenVMS I64 operating system
    or you can install or upgrade layered products that are included
    on the OpenVMS I64 distribution media (CD/DVD).

    You can also execute DCL commands and procedures to perform
    "standalone" tasks, such as backing up the system disk.

    Please choose one of the following:

        1)  Upgrade, install or reconfigure OpenVMS I64 Version V8.4
        2)  Display layered products that this procedure can install
        3)  Install or upgrade layered products
        4)  Show installed products
        5)  Reconfigure installed products
        6)  Remove installed products
        7)  Find, Install or Undo patches; Show or Delete Recovery Data
        8)  Execute DCL commands and procedures
        9)  Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?) 8



    WARNING --

    The normal OpenVMS startup procedure has not executed.
    Some commands and utilities will not work as documented.
    HP does not support PRODUCT INSTALL and other
    PRODUCT operations in this environment.


    Enter DCL commands -- Enter "LOGOUT" when done.
    When you enter "LOGOUT" a message will be displayed saying
    "Process SA_STARTUP_DCL logged out at <date> <time>",
    and you will be returned to the menu.

$$$
```

Restoring the system disk from the KnapSac pacset

After the minimum VMS system is booted, the KnapSac pacset which contains the system

disk image is used to restore the system disk. The steps to restore the system disk from the pacset consist of a) defining the pacset as a foreign command, b) initializing the target system disk, c) mounting the target disk /foreign, and d) executing the pacset using the /image qualifier to restore the system disk.

After the restore completes, log out of the VMS system and shutdown the computer to the >>> prompt.

```
$$$ mount/over=id dka100:                              ; mount the disk which has the pacset
%MOUNT-I-MOUNTED, I64SYS mounted on _DKA100:
$$$ initialize dkb200: IVMS84                          ; initialize the target disk
$$$ mount/foreign dkb200:
%MOUNT-I-MOUNTED, IVMS84 mounted on _DKB200:
$$$ kspacset := $dka100:[ksbackup]dkb200img.pac        ; define the foreign command
$$$ kspacset restore dkb200: /image                    ; restore the system disk
%KNAPSAC-I-VERSION, KnapSac IA64 Version 2.3-0 Level D starting on  7-NOV-2011 1
6:20:55.40


                KnapSac Statistics


Elapsed Time:     00:58:38.18      CPU Time:     0:08:10.40
Buffered I/O:           62      Direct I/O:     1068459
```

Remove the previous system disk boot option

After the system disk is restored, run the boot options command procedure to remove the previous boot option for the system disk. The previous boot option will no longer work, so it must be removed and replaced with a new boot option.

```
$$$ @sys$manager:boot_options.com


    OpenVMS I64 Boot Manager Boot Options List Management Utility

    (1) ADD an entry to the Boot Options list
    (2) DISPLAY the Boot Options list
    (3) REMOVE an entry from the Boot Options list
    (4) MOVE the position of an entry in the Boot Options list
    (5) VALIDATE boot options and fix them as necessary
    (6) Modify Boot Options TIMEOUT setting


    (B)  Set to operate on the Boot Device Options list
    (D)  Set to operate on the Dump Device Options list
    (G)  Set to operate on the Debug Device Options list

    (E) EXIT from Boot Manager utility

    You can also enter Ctrl-Y at any time to abort this utility.
```

Enter your choice: **2**

To display all entries in the Boot Options list, press Return.
To display specific entries, enter the entry number or device name.
(Enter "?" for a list of devices):

EFI Boot Options list: Timeout = 10 secs.

```
Entry  Description                                      Options
-----  ------------------------------------------------ ------------
   1   VMS83
       DKA0 PCI(0|20|1|0) Scsi(Pun0,Lun0)
   2   VMS82
       DKA100 PCI(0|20|1|0) Scsi(Pun1,Lun0)
   3   HP-UX Primary Boot: 0/1/1/0.0.0
       Non-OpenVMS Boot entry
   4   VMS84 PKB0.2
       DKB200 PCI(0|20|1|1) Scsi(Pun2,Lun0)
   5   EFI Shell [Built-in]
       VenHw(d65a6b8c-71e5-4df0-d2f009a9)
   6   DVD-ROM
       DQA0 PCI(0|0|2|0) ATA(Primary,Master)
-------------------------------------------------------------------------
```
6 entries found.

Enter your choice:

OpenVMS I64 Boot Manager Boot Options List Management Utility

(1) ADD an entry to the Boot Options list
(2) DISPLAY the Boot Options list
(3) REMOVE an entry from the Boot Options list
(4) MOVE the position of an entry in the Boot Options list
(5) VALIDATE boot options and fix them as necessary
(6) Modify Boot Options TIMEOUT setting

(B) Set to operate on the Boot Device Options list
(D) Set to operate on the Dump Device Options list
(G) Set to operate on the Debug Device Options list

(E) EXIT from Boot Manager utility

You can also enter Ctrl-Y at any time to abort this utility.

Enter your choice: **3**

Enter the entry number to delete.
To clear the Boot Options list, enter "ALL".

(Enter "?" to display Boot Options list): **4**

EFI Boot Options list: Timeout = 10 secs.

Entry Description   Options
----- --- ------------
  4   VMS84 PKB0.2
      DKB200 PCI(0|20|1|1) Scsi(Pun2,Lun0)
----
1 entries found.

Do you really want to delete this option? (Yes/No) **y**

efi$bcfg: Entry 4 Boot0005 removed.

Enter your choice:

   OpenVMS I64 Boot Manager Boot Options List Management Utility

   (1) ADD an entry to the Boot Options list
   (2) DISPLAY the Boot Options list
   (3) REMOVE an entry from the Boot Options list
   (4) MOVE the position of an entry in the Boot Options list
   (5) VALIDATE boot options and fix them as necessary
   (6) Modify Boot Options TIMEOUT setting

   (B) Set to operate on the Boot Device Options list
   (D) Set to operate on the Dump Device Options list
   (G) Set to operate on the Debug Device Options list

   (E) EXIT from Boot Manager utility

   You can also enter Ctrl-Y at any time to abort this utility.

Enter your choice: **e**
$$$

Set a new boot option for the restored system disk

$$$ mou/over=id dkb200:
%MOUNT-I-MOUNTED, IVMS84 mounted on _DKB200:
$$$ set bootblock dkb200:[vms$common.sys$ldr]sys$efi.sys
$$$ @sys$manager:boot_options.com

   OpenVMS I64 Boot Manager Boot Options List Management Utility

(1) ADD an entry to the Boot Options list
(2) DISPLAY the Boot Options list
(3) REMOVE an entry from the Boot Options list
(4) MOVE the position of an entry in the Boot Options list
(5) VALIDATE boot options and fix them as necessary
(6) Modify Boot Options TIMEOUT setting

(B) Set to operate on the Boot Device Options list
(D) Set to operate on the Dump Device Options list
(G) Set to operate on the Debug Device Options list

(E) EXIT from Boot Manager utility

You can also enter Ctrl-Y at any time to abort this utility.

Enter your choice: **1**
Enter the device name (Enter "?" for a list of devices): **dkb200:**

Enter the desired position number (1,2,3,,,) of the entry.
To display the Boot Options list, enter "?" and press Return.
Position [1]: **4**

Enter the value for VMS_FLAGS in the form n,n.
VMS_FLAGS [NONE]:

Enter a short description (do not include quotation marks).
Description ["DKB200:"]: **VMS84**

efi$bcfg: dkb200: (Boot0005) Option successfully added

Enter your choice:

OpenVMS I64 Boot Manager Boot Options List Management Utility

(1) ADD an entry to the Boot Options list
(2) DISPLAY the Boot Options list
(3) REMOVE an entry from the Boot Options list
(4) MOVE the position of an entry in the Boot Options list
(5) VALIDATE boot options and fix them as necessary
(6) Modify Boot Options TIMEOUT setting

(B) Set to operate on the Boot Device Options list
(D) Set to operate on the Dump Device Options list
(G) Set to operate on the Debug Device Options list

(E) EXIT from Boot Manager utility

You can also enter Ctrl-Y at any time to abort this utility.

Enter your choice: **e**
$$$

Shutdown the minimum VMS system and boot the restored system disk

$$$ lo
 Process SA_STARTUP_DCL logged out at 7-NOV-2011 18:51:58.86

    ****

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    "standalone" tasks, such as backing up the system disk.

    Please choose one of the following:

        1) Upgrade, install or reconfigure OpenVMS I64 Version V8.4
        2) Display layered products that this procedure can install
        3) Install or upgrade layered products
        4) Show installed products
        5) Reconfigure installed products
        6) Remove installed products
        7) Find, Install or Undo patches; Show or Delete Recovery Data
        8) Execute DCL commands and procedures
        9) Shut down this system

Enter CHOICE or ? for help: (1/2/3/4/5/6/7/8/9/?) **9**

    Shutting down the system

**** No supported device(s) found in DUMP_DEV
**** Boot driver initialization routine returned failure
**** Error log buffer dump canceled, no dump file available

      SYSTEM SHUTDOWN COMPLETE

**** Primary HALTED with code HWRPB_HALT$K_REMAIN_HALTED

****   Hit any key to cold reboot   ****
P00>>>

......<reset>......

```
************************************************************
* ROM Version : 02.31
* ROM Date    : 03/11/2004
* BMC Version :  01.52
************************************************************
1 0 0x0000A4 0x000 0000000000000000 start memory discovery
1 0 0x000014 0x0000000000000000 CPU0 starting cell relocation
1 0 0x000009 0x0000000000000000 CPU0 launch EFI
1 0 0x000207 0x00000000000E003D CPU0 starting EFI


POSSE Library version  0.10 is loading...
   CellularPlatform = FALSE (use "setcell" to toggle)



EFI version 1.10 [14.61]
EFI64 Running on Intel(R) Itanium Processor Family
EFI 1.10 IPF zx6000/rx2600/zx2000 1.22 [Thu Mar 11 14:22:35 2004] - HP


Copyright (c) 2000-2002 Broadcom Corporation
Broadcom NetXtreme Gigabit Ethernet EFI driver v3.0.7


Loading 'FPSWA'...
Loading 'lsi1030'...
Loading 'gigundi'...
2 0 0x00020B 0x0000000000000006 EFI Launching Boot Manager
Scsi(Pun0,Lun0) HP 36.4GST336753LC     HPC5 (320 MBytes/sec)
Scsi(Pun1,Lun0) HP 36.4GST336753LC     HPC4 (320 MBytes/sec)
Scsi(Pun2,Lun0) HP 36.4GMAS3367NC      HPC3 (320 MBytes/sec)
Broadcom NetXtreme Gigabit Ethernet Adapter is detected (PCI)


EFI Boot Manager ver 1.10 [14.61]  Firmware ver 2.31 [4411]


Loading device drivers


Loading.: Auxiliary Floating Point Driver
Load of Auxiliary Floating Point Driver failed: Not Found


EFI Boot Manager ver 1.10 [14.61]  Firmware ver 2.31 [4411]


Please select a boot option

    VMS83
    VMS82
    HP-UX Primary Boot: 0/1/1/0.0.0
    VMS84 PKB0.2
    EFI Shell [Built-in]
    DVD-ROM
    Boot Option Maintenance Menu
    System Configuration Menu


    Use ^ and v to change option(s). Use Enter to select an option
```

Loading.: VMS 84 PKB 0.2
Starting: VMS84 PKB0.2

  HP OpenVMS Industry Standard 64 Operating System, Version V8.4
  © Copyright 1976-2010 Hewlett-Packard Development Company, L.P.

%DECnet-I-LOADED, network base image loaded, version = 05.17.00

%STDRV-I-STARTUP, OpenVMS startup begun at 7-NOV-2011 18:54:01.23

The OpenVMS system is now executing the site-specific startup commands.

  SYSTEM   job terminated at 7-NOV-2011 17:54:41.69

  Accounting information:
  Buffered I/O count: 5727   Peak working set size: 10528
  Direct I/O count: 2158   Peak virtual size: 250432
  Page faults: 13714   Mounted volumes: 0
  Charged CPU time: 0 00:00:02.00   Elapsed time: 0 00:59:19.34