Successful System Cloning using Ignite-UX

hp

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Abstract

Ignite-UX for HP-UX addresses the need for system administrators to perform operating system installations, deployment, and recovery, often on a large scale. It provides the means for creating and reusing standard operating system configurations. Additionally, Ignite-UX delivers the ability to archive operating system configurations and to use these archives to replicate systems, with the added benefit of speeding up the process. Ignite-UX also permits various customizations, and is capable of both interactive and unattended operating modes.

Executive Summary

There are a number of issues that can affect the ability to clone or recover a client or Ignite-UX server. To that end, this paper describes the issues and potential problems that may affect your decision as to the benefits of cloning in your environment. Additionally, you must consider the version of Ignite-UX to use because there are issues relevant to what version of installation media you would need to install a system.

Note:

This paper is only intended to present issues that you should consider when determining which Ignite-UX version to use when cloning or recovering systems. It does not contain referential materials to determine the ability to clone your systems.

HP-UX 11i Release Names and Release Identifiers

Each HP-UX 11i release has an associated release name and release identifier. Table 1 shows the releases available for HP-UX 11i.

Table 1

Release Name	Release Identifier	Supported Processor Architecture
HP-UX 11i v1	B.11.11	PA-RISC
HP-UX 11i v1.5	B.11.20	Intel® Itanium
HP-UX 11i v2	B.11.23	Intel® Itanium PA-RISC[1]

The uname(1) command with the -r option returns the release identifier.

You can also determine the update release date and the Operating Environment by entering the following:

```
# swlist | grep HPUX11i
```

The resulting output lists the current release identifier, update release date, and Operating Environment. For example:

```
HPUX11i-TCOE    B.11.23.0409 HP-UX Technical
 Computing Operating Environment Component
```

---

1 PA-RISC is supported on HP-UX 11i v2 starting with the September 2004 release.

The preceding revision string represents the following:

```
B.11.23 = HP-UX 11i v2
```

Cloning and Recovery Main Issues to Consider

There are four main cloning issues you must consider:

- [Does the version of Ignite-UX I am using provide support for my system?](#)

- [Does the version of Ignite-UX I am using support all of the input/output (I/O) cards in my system?](#)

- [Does the recovery archive, golden image, or SD core operating system depot I am using support my hardware?](#)

- [Does HP support the version of Ignite-UX I am using?](#)

How these issues can affect your success in cloning and recovering systems is described as follows.

Does the version of Ignite-UX I am using provide support for my system?

The first main issue to consider relates to determining the versions of Ignite-UX that can be used for cloning, recovery, and installation. What version of Ignite-UX is required to support the client on which you intend to install or recover HP-UX? How do you determine which version of Ignite-UX is required? To answer these questions, you must consider which revisions of Ignite-UX provide support for the various HP-UX installation kernels and newly available hardware.

HP-UX Installation Kernel Support

It is important to understand which versions of HP-UX are contained in the Ignite-UX installation kernels used by each version of Ignite-UX. This correlation is provided in Table 2:

Table 2

Ignite-UX Version	HP-UX revision of installation kernel
B.2.*x.x*	11.0 [B.11.00]
B.3.*x.x*	11i v1 [B.11.11]
B.4.*x.x*	11i v1 [B.11.11] (PA-RISC systems
B.5.*x.x*	11i v1 [B.11.11] (PA-RISC systems)/11i Version 2 [B.11.23] (Itanium®-based systems)

Now, you can see that some cloning and recovery, as well as installation operations are not possible for older servers and workstations; therefore this activity is not supported by HP.

For example, you can not clone a B180 workstation running HP-UX 11.0 to a 735 workstation using Ignite-UX version B.5.3.*x*, because HP-UX 11i v1 is not supported to operate on a 735 workstation. The highest Ignite-UX revision that you could use for this purpose, since 735 workstations are not supported on HP-UX 11i v1, is Ignite-UX version B.2.6.*x*[2].

For more information, refer to the "Workstation/Server Specific Information" chapter of the *HP-UX 11i v1 Release Notes* found online at the HP Technical Documentation Web site at:

http://www.docs.hp.com/hpux/os/11i/index.html#Release%20Notes

In other words, systems that support running 11.0 but not 11i v1 must use Ignite-UX version B.2.6.*x*, which was the last version delivered with an 11.0 installation kernel.

Note:
With the release of Ignite-UX C.*x.x*, the product architecture is adapted to support multiple HP-UX installation kernels based upon the operating system version you select for installation. However, an 11i v1 installation kernel is still used to install and recover HP-UX 11.0 systems. The same is true for HP-UX 11i v1.6 as the 11i v2 Itanium®-based installation kernel is used to install and recover these systems.

New System Support

Now you must consider when the hardware became available from HP. If the system is relatively new, was support provided for it with the initial release of 11i v1, or was support added with an Operating Environment (OE) quarterly release?

Information about newly supported systems is located in the *Read before Installing or Updating to HP-UX 11i v1* and the *HP-UX 11i v1 Release Notes.* You should note that each OE release contains the information related to that particular release, so you may have to review several editions of these documents to locate the information relevant to your system.

If support was added by means of an OE quarterly release, you must determine the release in which support was added. Once you have the release date of the given OE quarterly release, you must determine the corresponding version of Ignite-UX that was released with that release.

To be certain of the version of Ignite-UX that was shipped with a particular OE quarterly release, you can use *swlist*(1M) on the OE media and review the output to get the version information.

For example, on an rp8400 system the following OE quarterly releases added support for the following[3]:

- September 2002 added support to boot using Ultra160 cards
- June 2002 added support for the faster PA8700 Central Processing Unit (CPU) (750 MHz and 875)
- December 2001 added support for the PA8700 CPU (650 MHz)
- First Release supported at 11i v1 with 550Mhz CPUs

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2 Every version of the HP-UX 11.0 installation media that has been released since the installation kernels went to 11i v1 has been running Ignite-UX version B.2.x. This is to maintain compatibility with systems that support running HP-UX 11.0 but not 11i v1.

3 This information was gathered from *Read before Installing or Updating to HP-UX 11i v1* and the *HP-UX 11i v1 Release Notes.*

- Ignite-UX B.3.7.*x* release added support for 750 and 875Mhz CPUs
- Ignite-UX B.3.6.*x* release added support for 650Mhz CPUs
- Ignite-UX B.3.0.*x* initial major release added support for 550Mhz CPUs

Does the version of Ignite-UX I am using support all of the I/O cards in my system?

This issue is similar to the first issue, though the concern here is what version of Ignite-UX is required to support the I/O adapters in your system. The following examples are designed to help you determine when support was provided for two specific I/O adapters so that you can apply that knowledge to your situation.

Example One

Consider the various Fibre Channel (FC) Host Bus Adapters (HBAs) that are or have been available for HP-UX (this list is not exhaustive and only depicts PCI cards):

- A3740A – 1Gb Tachyon-based FC HBA
- A5158A – 1Gb Tachlite-based FC HBA
- A6795A – 2Gb XL2 based FC HBA

The FC HBA based upon the Tachyon chip is not supported with HP-UX 11i v1; it is only supported with HP-UX 11.00. If you have a Tachyon-based FC HBA in your system and use Ignite-UX B.3.0.*x* and above, you will not be able to access any devices attached to that HBA during recovery since the FCMS driver in the installation kernel cannot claim the interface card because the kernel is based upon 11i v1.

Even though the system may be running HP-UX 11.0 and using a Tachyon-based HBA with no problems, the Ignite-UX version you choose to run can impact the recoverability of the system.

The Tachlite-based FC HBAs support was added with Ignite-UX version B.3.3.*x* and released with the March 2001 OE quarterly release. If you had an rp8400 with the base version of 11i v1 (550 MHz CPUs) and A5158A FC HBAs, you could install an earlier version of Ignite-UX and not realize that problems exist until you attempt to recover this system. At that time, your system would not be able to detect any devices on the A5158A HBAs.

The A6795A XL2-based FC HBA requires Ignite-UX version B.3.5.*x* to be claimed; therefore, earlier revisions of Ignite-UX cannot detect devices from these HBAs.

This example illustrates the importance of considering the I/O cards in your system, as well as the system itself, when attempting to determine the most appropriate Ignite-UX version to use[4].

It is not just FC HBAs adapters that may be affected; you should consider all interface cards in your system especially newer interface cards.

Example Two

Let us consider some hardware changes to the rp84*xx* systems. The A6096A Core I/O adapter was replaced by the A7109A Core I/O adapter (in September 2003). The Gigabit Ethernet Local

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[4] Even when you do not require access to devices on these HBAs during a recovery because Ignite-UX detects any devices through the HBA if the Ignite-UX revision is too low it will not preserve instance numbers for the devices. This has the potential to lead to issues with LVM volume groups if any are accessible through that HBA.

Area Network (LAN) interface on the new Core I/O adapter is now controlled by the new `igelan` driver, rather than the old `gelan` driver.

To operate successfully, the new A7109A Core I/O adapter requires at least version B.11.11.09 of the `igelan` driver. If you are using an older version of Ignite-UX, the following errors are generated when booting from the network via that LAN interface:

```
tftp> Transfer timed out.
ERROR:   Could not read /var/opt/ignite/INDEX from install tftp server
```

After this message, the **LAN Interface Selection** screen appears, but the Gigabit Ethernet adapter on the Core I/O card (hardware path 0/0/0/1/0 on the rp8400) does not appear in the list.

The problem is that the Gigabit Ethernet adapter on the new A7109A Core I/O adapter requires at least version B.11.11.09 of the `igelan` driver (the earlier A6096A Core I/O used the `gelan` driver). This version of the `igelan` driver is included in Ignite-UX version B.4.4.*x* and greater.

You can see that the version of Ignite-UX you choose to use must be consistent with the hardware in the system.

Does the recovery archive, golden image, or SD core operating system depot I am using support my hardware?

In the case of recovery archives used for cloning, golden images, or SD Core Operating System depots used for installation, you must to consider all of the same questions for clients:

- Does the revision of Ignite-UX I am using support my clients?
- Does the revision of Ignite-UX I am using support all of the I/O cards in my clients?

We have considered these issues for recovery; you must also consider these same issues for cloning, as well as installation.

Understanding the Dependencies Between OE Media and Ignite-UX

There is a circular dependency between the OE media you use to install a client and the version of Ignite-UX that was factory-installed and is invoked to install the product from the OE media.

The Ignite-UX installation kernels are built with the patches provided by the OE media to enable them to support the newer hardware for which that version of the OE has added new support.

For this reason, when you determine what version of an OE is required to support your client's hardware, you must use, as a minimum, the version of Ignite-UX that comes with it.

Example

You have the 11i v1 OE media from March 2001 in an SD depot and are going to install it onto an rp8400 with Ignite-UX version B.5.3.*x*. The boot disk is on a Storage Area Network (SAN) device via an A6795A (2GB XL2-based FC HBA). Assume that the rp8400 has the minimum required firmware for booting from the HBA. What are the potential problems that may occur?

The OE that we have used does not provide support for the A6795A FC HBA so it cannot be claimed by the final installation kernel. Since the boot device cannot be claimed, the client panics upon booting.

So it is not simply Ignite-UX that must provide support for the client and its I/O adapters; the operating system version that you choose to install must support them as well.

Does HP support the version of Ignite-UX I am using?

One important thing to consider is the support life of the Ignite-UX product. HP supports releases of Ignite-UX for 27 months subsequent to the release. In other words, 27 months after the release date listed in the *Ignite-UX Release Notes,* support for the given release ceases at that month's end. Table 3 illustrates some examples of this concept:

Table 3

Ignite-UX Version	Release Date	Support Ends
B.5.3.*x*	April 2004	31st July 2006
B.4.2.*x*	April 2003	31st July 2005
B.3.7.*x*	April 2002	31st July 2004
B.3.6.*x*	January 2002	30th April 2004

This support life policy allows for 9 concurrently supported versions of Ignite-UX. The following document lists all released versions of Ignite-UX.

http://www.docs.hp.com/en/IUX/docs/Supported_Versions.pdf

HP does not provide patches for Ignite-UX; defect fixes and new functionality are only released in new versions of Ignite-UX. New versions of Ignite-UX are released approximately every three months.

Note:
Ignite-UX version B.2.6.*x* remains supported for users of HP-UX 11.0
until HP-UX 11.0 is no longer supported[5].

Understanding Archive Format Limitations

The `make_net_recovery` and `make_tape_recovery` commands use the `make_sys_image` script to produce recovery archives. The `make_sys_image` script uses *pax* to write the archives.

The `pax` command on HP-UX supports the following formats:

1. Extended `cpio` interchange format (`cpio`).
2. Extended tar interchange format (ustar).

The following sections discuss the effects of limitations in the formats `pax` supports that have been encountered while using Ignite-UX. Because international standards (POSIX.2, XPG4, and others)

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[5] Only on PA-RISC systems that do not support HP-UX releases after 11.00.

control the behavior of pax, these issues cannot be resolved with code changes. This section documents areas that may affect you so you can make an informed decision about which archive format to use.

For the make_net_recovery and make_tape_recovery commands the default is to use extended tar interchange format for archives (the option -m tar), and to change to extended cpio interchange format the option -m cpio must be used.

Over time patches to *pax* have removed some of the limitations in *pax*. This has allowed pax to increase its support for both cpio and ustar formats to the maximums that the formats allow (file size, maximum uid and gid values). Information provided here about what those maximums are as they are less than what file systems on HP-UX supports. This section does not discuss the patch history of pax. It assumes that pax has been patched up to a level that addresses those limitations to the extent possible.

Path Name Length Limitations in ustar Format

The full path to a file in ustar format can be split between the different fields in the header record describing a file in the archive. The two fields have the following names and length (and they occur in different parts of the header describing the file):

Name[6]	Length
name	100
prefix	155

Standards[7] control how a file name is placed into these two fields. If the name of the file is less than or equal to 100 octets then the file name will be contained within the name field. If the name of the file is more than 100 octets long the name must be split between the name and prefix field.

When the name of the file is split between the two fields it is not allowed to be split in the middle of a path component. That means you can only split the file name where a '/' occurs. To put the file name back together, as required by standards, you take the prefix field (if not NULL) followed by a '/', then place the name field at the end. The way that the file name is put back together controls how it can be split between the two fields.

For example, the following file name 'afilename', will not fit into a ustar format archive because the path cannot be split leaving whole path components and still fit within the prefix and name fields so it will not be added to the archive:

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[6] The names used here are the field names used in the Single Unix Specification Version 2.

[7]. The Open Group's Single Unix Specification Version 2 can be viewed online by registering at http://www.opengroup.org/. Viewing the standard online enables you to identify the limitations discussed in this section more clearly.

```
# mkdir thisisareallylonglonglongnamethatwillnotfitinapaxarchivewhen\
> youareusingustarformatbecausethedirectorynameistoolongandnosuitabl\
> epointwillbefoundtosplititsoitwillfit
# touch thisisareallylonglonglongnamethatwillnotfitinapaxarchivewhen\
> youareusingustarformatbecausethedirectorynameistoolongandnosuitabl\
> epointwillbefoundtosplititsoitwillfit/afilename
# pax -w -f backup.tar -x ustar this*
pax: thisisareallylonglonglongnamethatwillnotfitinapaxarchivewhenyoua
reusingustarformatbecausethedirectorynameistoolongandnosuitablepointw
illbefoundtosplititsoitwillfit/ : Path name element too long – skipped
pax: thisisareallylonglonglongnamethatwillnotfitinapaxarchivewhenyoua
reusingustarformatbecausethedirectorynameistoolongandnosuitablepointw
illbefoundtosplititsoitwillfit/afilename : Path name element too long
– skipped
```

When splitting the file name, the largest part possible is placed into the name field. In the above example for the file `afilename`, the basename will fit into the name field. However the prefix part that we're left with is too large for the prefix field so the file cannot be added to the archive. The directory name that would be placed into the prefix field is more than 155 octets long so it cannot fit.

If you encounter this issue consider either:

- Changing your directory structure if you want to continue using ustar format and shorten any directory names that will not fit in ustar format.
- Switching to `cpio` format archives as they do not have this limitation.

User/Group Name and uid/gid Issues in ustar Format

The `pax` ustar format stores both a user and group name (limited to 32 octets in length each) and a `uid` and `gid` value.

The standards controlling the behavior of `pax` require that when restoring an archive in ustar format the user and group name associated with a file name is used in preference to the `uid` or `gid` information from the ustar format archive if information for the user or group can be retrieved.

This causes an issue if unsupported changes to the `uid` or `gid` values for reserved users (those `uid` and `gid` values that are less than 100) are made in the `/etc/passwd` or `/etc/group` files on HP-UX. During a recovery Ignite-UX has access to only a small `/etc/passwd` file. This file is in a new configuration state and it is not from the system that is being recovered.

For example, if you were to change the `uid` of the `www` user from 30 to 3000 and issue a `chown` to change the ownership of the files owned by `uid` 30 to 3000 you would see problems after a recovery. Since the `www` user is a reserved user it is present in the `passwd` file used by Ignite-UX during a recovery, this means that the `uid` the files owned by this user will have been recovered with a `uid` of 30 not 3000. Remember that if information about a user can be retrieved, then that information is used in preference to the `uid` stored in the archive.

It is worthwhile noting at this point that HP does not test HP-UX or its layer products with any changes to the `uid` of reserved users. Because this is not tested, any problems encountered due to the changing of the uid of a reserved user are not considered a defect in HP-UX.

If you encounter this issue, choose one of the following:

- Do not change the `uid` or `gid` of reserved users or groups, or
- Use `cpio` format archives. The `cpio` format does not store a user and group names only `uid` and `gid` values, so the `uid` and `gid` values from a `cpio` format archive will be recovered "as is".

Note:
The `make_sys_image` command does not provide a warning about this issue.

Comparing Maximum `uid` and `gid` Values

The `pax` utility has different limitations for the maximum value it can store for a `uid` or `gid` depending on the archive format selected. Those limitations are summarized here.

In ustar format:

- Raw `uid` values stored in the archive may be up to 2097152.

  Since ustar format keeps the name of the user (up to 32 octets of it) if the user does exist on the system the `uid` returned via a library call like `getpwnam()` will be used instead.
- Raw `gid` value stored in the archive may be up to 2097152.

  Since ustar format keeps the name of the group (up to 32 octets of it) if the group does exist on the system the `gid` returned via a library call like `getgrnam()` will be used instead.

In `cpio` format:

- The maximum `uid` allowed by the `cpio` format is 262144
- The maximum `gid` allowed by the `cpio` format is 262144

If you use large `uid` or `gid` values, you should consider which limitation will impact you more. That is the `uid` or `gid` information not being recovered if you use `uid` or `gid` values larger than 262144 (do not use `cpio` format) or 2097152.

If you encounter this issue, choose one of the following:

- Do not include directories or volume groups that contain files with `uid` or `gid` values larger than the pax format you have chosen allows. Try to keep those `uid` or `gid` values outside of the root volume group and do not include other volume groups into a recovery archive – the Ignite-UX commands `make_net_recovery` and `make_tape_recovery` are not intended to be used as backup utilities. They are intended only for the recovery of systems.
- Use ustar format archives if you have `uid` or `gid` values larger than 262144, but less than or equal to 2097152 in the volume groups that will be included into a recovery archive (or a golden image).
- If you have `uid` or `gid` values larger than 2097152 consider writing a script that will save information about file names and the name of the owner and group of the file so you can run

another script after a recovery to change the ownership on files that did not have their user or group information correctly recovered.

- Backup files that are owned by large `uid` or `gid` values using a backup utility such as `fbackup`, these files can be restored after a recovery to preserve the ownership information. If there are not too many of these files you can run this backup to a file that will be included into the recovery archive so it can be restored immediately after the recovery (this assumes that you do not need to recover more up to date files from your regular system backups).

Files Belonging to nobody/nogroup

Normally files created by root on NFS mounts are created with the owner and group of nobody and nogroup (unless you specifically allow remote `root` access to the exported file system).

The `uid` and `gid` values for `nobody` and `nogroup` is -2. This presents a problem when those files are included into a recovery archive (or a golden image). The `chown(2)` family of system calls do not allow you to change the `uid` or `gid` associated with a file or directory to -2. This means that the ownership information for files owned by `nobody` or `nogroup` will not be recovered.

During a recovery attempt this means that `pax` will print many errors if there are entries in the archive owned by `nobody` or `nogroup`, such as:

```
pax_iux: opt/apache2/lib/htdocs/processlist/index.htm : An error
occurred attempting to preserve the owner and group ids.
```

If you encounter this issue you should consider:

- Ensuring that no files owned by `nobody` and `nogroup` will be included into a recovery archive (run a job to find these files and change their ownership), or
- If changing the ownership of files owned by `obody` and `nogroup` is not possible in your environment after all of the warnings are printed on the console when you see the following question:

```
ERROR: Cannot load OS Archive ( Recovery Archive ) The
configuration process has incurred an error, would you like to push a
shell for debugging purpose? ( y/[n] )
```

Answer `y`, then when you have a shell prompt enter the following command:

```
# exit 2
```
This causes Ignite-UX to ignore the errors about not being able to change the ownership of the files. Please review all of the messages displayed by `pax` as there may be other errors apart from the ownership messages.

Additional cloning and recovery issues to consider

The following issues are analogous to the main issues previously presented although they provide a different perspective intended to further assist you:

- [Does Ignite-UX run on the system?](#)

- [Upgraded systems and older versions of Ignite-UX](#)

- [Does the recovery archive or golden image support the system?](#)

- [Am I going to clone a system that has the same hardware model string?](#)

- [Do I have a high enough firmware revision to run the version of HP-UX that is in the Ignite-UX installation kernel?](#)

- [Do I have any HP-UX applications loaded that are known to have problems after being loaded onto cloned systems?](#)

The sections that follow describe these additional issues for your consideration.

Does Ignite-UX run on the system?

Previously, support for new systems and how to determine what OE and Ignite-UX version are required was described. By way of the following example, this section presents the symptoms that you may encounter when Ignite-UX does not support a given system at all.

Example

You have the 11i v1 OE media from March 2004 in a depot and want to install it onto an rp3440 with Ignite-UX version B.3.3.*x*. The boot disk is on a SAN device via an A6795A (2GB XL2-based FC HBA). What potential problems might you encounter?

In this case the installation kernel panics upon boot with panic messages similar to the following:

```
Stored message buffer up to panic:
PDC_MODEL_CPU_ID returned 0x14

System Panic:

linkstamp:          Wed Jul 11 16:30:57 MDT 2001
_release_version:   @(#)               $Revision: vmunix:    vw: -proj
selectors: CUPI80_BL2000_1108 -c 'Vw for CUPI80_BL2000_1108 build' --
cupi80_bl2000_1108 'CUPI80_BL2000_1108'  Wed Nov  8 19:24:56 PST 2000 $
panic: set_machine_parameters_64: Unidentified cpu type returned from
PDC_MODEL

PC-Offset Stack Trace (read across, top of stack is 1st):
  0x00210590  0x002640c8  0x00263ee8
  0x004a1e2c  0x00205ae4  0x002008b4
End Of Stack
```

In this case, the installation kernel does not support the system being installed or recovered. You need to upgrade the version of Ignite-UX you are using, in this case to version B.5.3.*x*.

Upgraded systems and older versions of Ignite-UX

The version of Ignite-UX required to recover a system can easily get disassociated from the version of Ignite-UX installed on a system. The following example illustrates this concept.

Example

You purchased an rp8400 server, and then installed Ignite-UX soon after this hardware was available. You have created monthly make_tape_recovery(1M) tapes for the system because they are part of your recovery strategy. The version of Ignite-UX that was installed has not changed and recovery operations were successful when tested prior to the system being used for its intended purpose.

A year ago it and its disaster recovery system were upgraded to 750 MHz PA8700 CPUs.

The repercussion resulting from this upgrade is that the installation kernel on the recovery tape panics when it is first booted because it does not support the newer PA8700 CPUs. This results in extended downtime because a recovery was initiated in a crucial situation.

Try one of the following procedures when faced with this situation:

1. Run `make_boot_tape` on a system with a high enough revision of Ignite-UX to support the faster CPUs.
2. Boot from the tape created in Step 1.
3. When queried at the first menu, replace the tape with the original recovery tape.
4. Continue to attempt to recover the system using the original recovery tape. If there are large differences in the versions of Ignite-UX, the recovery may not work because of changes to the configuration files.

Or

1. Boot from media.
2. Follow the dual-media recovery instructions in the "Tape Recovery with No Tape Boot Support" section of the "System Recovery" Chapter of the *Ignite-UX Administrators Guide*.

Does the recovery archive or golden image support the system?

This is a similar question to the previous question ([Does the recovery archive, golden image, or SD core operating system depot I am using support my hardware?](#)) although from a different perspective.

When cloning a system, installing a golden image, or installing from a core operating system depot you must determine whether your Ignite-UX server contains the required drivers, software, and/or patches to support your clients. Additionally, the hardware on which a golden image or recovery archive is created can have an impact on the ability to clone as well.

Example 1

You created a golden image on an N4000. When installing from the OE media, because the N4000 does not support hard partitions, some software may not be selected for installation or configured for hard partitioned systems as in this example. The Partition Manager product (fileset `PartitionManager.PARMGR`) in HP-UX 11i v1 contains the following product configuration script:

```
#
# Register our TM, DA, and CB files if we are running on a system that
# supports hardware partitions
#
if [ -x /usr/sbin/parstatus ]; then

    # Check to see if the system supports hardware partitions
    /usr/sbin/parstatus -s
    if [ $? -eq 0 ]; then
        /usr/sam/bin/samreg /opt/parmgr/lib/parmgr
        if [ $? -ne 0 ]; then
            echo "ERROR:   PartitionManager unregistration failed."
            exit $FAILURE
        fi

        # restart samd
        kill_named_procs samd 9
    fi
fi
```

This means that the hard partition software is only registered with System Administration Manager (SAM) if the software was initially installed on a hard-partitioned system.

If you are able to successfully install the golden image onto an rp8400, you will not be able to access Partition Manager via SAM though it may work from the command line. You would have to reconfigure the `PartitionManager.PARMGR`[8] fileset to allow the execution of *parmgr*(1M) from SAM.

Example 2

Consider carefully where you create your golden images or what you plan to use as a source for cloning. The same applies to the architecture of the system that you would use as the source for a golden image or where you create a recovery tape to be used for cloning.

In addition, consider that there are some PA-RISC 2.0 only products and patches for HP-UX 11.0 and 11i v1. If a recovery archive or golden image is created on a PA-RISC 2.0 system and you attempt to recover it to a PA-RISC 1.1 system, some components of HP-UX may not work.

For example, the following patches are for PA-RISC 2.0 systems only:

```
PHSS_30174   s700_800 11.X   3D Common Run (PA2.0 only)
PHSS_30175   s700_800 11.X   PEX 5.1/Starbase/Hardcopy Run (PA2.0 only)
PHSS_30176   s700_800 11.X   PHIGS Dev (PA2.0 only)
PHSS_30177   s700_800 11.X   PHIGS Run (PA2.0 only)
PHSS_30178   s700_800 11.X   Starbase/Hardcopy Dev (PA2.0 only)
PHSS_30179   s700_800 11.X   OpenGL 1.1 Dev (PA2.0 only)
PHSS_30180   s700_800 11.X   OpenGL 1.1 Run (PA2.0 only)
PHSS_30183   s700_800 11.X   DDA Run (PA2.0 only)
PHSS_30184   s700_800 11.X   PEX 5.1 Dev (PA2.0 only)
PHSS_30185   s700_800 11.X   PEX 5.1 Run (PA2.0 only)
```

If these products are needed on a PA-RISC 1.1 system as well, they would no longer work because the patches are newer.

---

8 Use the following to reconfigure the fileset: `swconfig -x reconfigure=true PartitionManager.PARMGR`

A good general guideline is to create golden images on the lowest common denominator hardware, for example, PA-RISC 1.1 systems if you have a mixture of PA-RISC 1.1 and 2.0 hardware. With very different architecture types, for instance npars capable systems vs. non-npars capable systems, some software may not be configured correctly if the golden images or recovery archives used for cloning were created on non-npars capable systems; the reverse is true also.

Example 3

Consider the following issue that relates to golden images and cloning from a non-partitionable system to a partitionable one.

In more recent OEs for 11i v1 and 11i v2, the iCAP software version is 6.x or 7.x. These versions of iCAP only install onto partitionable systems. If you create a recovery archive for cloning or a golden image for installation on a non-partitionable system and clone or install it, the system will not have any iCAP software loaded.

This will cause problems for partitionable systems because the iCAP WBEM provider will not be installed.

This WBEM provider is responsible for authorizing certain activities performed by the various nPar commands, such as `parcreate`(1M), `parmodify`(1M), and `parremove`(1M) on iCAP systems. The iCAP WBEM provider must be present, or it cannot be determined whether the system is an iCAP system or not. The nPar commands may refuse to work without the presence of the iCAP software (specifically, the iCAP WBEM provider).

The lack of iCAP software on partitionable vPars systems is likely to cause problems, as well.

Do I have kernel tuneables set such that cloning cannot work?

Ignite-UX will recover or clone a system using the kernel tuneables that were set in the recovery archive. You can set kernel tuneables to consume a large amount of physical memory. If you're cloning a system and the target system has less memory, it is possible that you may not be successful in cloning the system.

Let us look at the buffer cache as an example. If you have `nbufs` and `bufpages` set to zero, the dynamic buffer cache will be used. If either or both `nbufs` and `bufpages` are set, you will have a static buffer cache. This buffer cache will occupy real memory and needs to be allocated during the system startup.

For example, if you have an rp8420 with 16Gb of memory and `bufpages` has been set to 260000 in the system file then the buffer cache is static and is just over 1Gb in size. If you attempt to clone this system to an N series system with 1Gb of memory the following occurs on first boot during the recovery (using an HP-UX 11.0 system):

```
linkstamp:          Mon Dec 20 21:27:01 EST 2004
_release_version:   @(#)B2352B/9245XB HP-UX (B.11.00) #1: Wed Nov  5
22:38:19 PST 1997
__kern_ci_revision: $Header: kern_sequence.c,v 1.6.106.512 97/11/05
18:01:46 msosa Exp $


panic: Insufficient buffer cache memory
```

The system panics on first boot because there is not enough memory to allocate the buffer cache so the cloning attempt fails.

Am I going to clone a system that has the same hardware model string?

If you are cloning to another system of the same model, you must use the Ignite-UX Graphical User Interface (GUI) to manually change the value of **Cloning to different HW?** to TRUE using the **Additional…** button on the **Basic** tab.

Ignite-UX determines whether you are cloning (installing) to different hardware or not based upon the setting of the model string for the system. A new kernel is not created when you are cloning to another system with the same model string. If the system that is being cloned requires different kernel drivers to support different hardware, these drivers may not be in the kernel because no new kernel is created.

For example, you could install to a disk for which the kernel in the archive did not contain drivers. This kernel would panic on boot because it could not activate the root volume group.

Do I have a high enough firmware revision to run the version of HP-UX that is in the Ignite-UX installation kernel?

When you are planning to use Ignite-UX to clone or recover systems, you must ensure that the firmware revision you are using is a high enough revision to run the version of HP-UX in the Ignite-UX kernel (see HP-UX installation kernel support).

The firmware requirements for running HP-UX 11i v1 are different from those for HP-UX 11.0 for some systems. For example, to enable On Line Addition [and] Replacement (OLAR) support on some platforms you should consult *HP-UX 11i Version 1 Installation and Update Guide* for information on the required firmware.

Do I have any HP-UX applications loaded that are known to have problems after being loaded onto cloned systems?

Some applications do not provide any `iux_postload` or `iux_postconfig` scripts to remove their configuration and/or address any potential issues when you are cloning a system.

Manual configuration may be required to clean up an application that gets confused after cloning. You may need to disable, remove, or reconfigure the application.

For example, the HP Instant Capacity (iCAP)[9] product (prior to version B.06.00) usually does not function correctly after cloning if the original system was an iCAP system:

```
# icod_stat
ERROR:   The software ID of this system does not match the ID stored
         in the iCAP processor configuration.  Contact your local support
         representative to correct the configuration.
```

---

[9] This product was formerly known as HP Instant Capacity on Demand (or iCOD) and has been changed to HP Instant Capacity for HP 9000 and HP Integrity Servers, also known as Instant Capacity or iCAP.

If you are running an iCAP version earlier than B.06.00 and you install a golden image or core operating system SD depot over an existing HP-UX installation, the system is left in a non-iCAP state. Consider the following issues when you plan for this situation as part of any (re)installation:

- iCAP version B.06.00 and later versions only support cell based systems. You should not install a golden image containing iCAP version B.06.00 or later onto a non-cell based system. V, N, and L series iCAP systems must continue to run pre-B.06.00 iCAP versions.
- Prior to reinstalling any existing cell-based iCAP system you should ensure that it is running iCAP version B.06.00 or later before reinstalling. When you upgrade to iCAP version C.06.00 or later the `icod_stat` command may generate a message indicating that the compliance state of the system requires an upgrade codeword. You can obtain the upgrade codeword from the iCAP portal; for more information, refer to the *HP Instant Capacity User's Guide* for your version of iCAP.
- It is safe to install iCAP version B.06.00 or later on any cell-based system. Any HP-UX OE media that supplies iCAP version C.06.00 or later requires that the iCAP software is installed on all cell-based systems even if non-iCAP. Failure to install the software may cause components of other software products used to manage partitions (vPars and nPars) to cease functioning. This is applicable to both iCAP and non-iCAP cell-based systems.

Summary

If you ensure that Ignite-UX is kept up-to-date on your system and carefully think about the software you are attempting to install, you are unlikely to encounter a lot of the problems described herein.

In general, if you find yourself asking the question, "What Ignite-UX version should I use?" please consider using the very latest version to ensure that all features, hardware, and software releases are included. To familiarize yourself with the contents of the Ignite-UX product, you can review the release notes for the latest release at:

http://www.docs.hp.com/en/IUX/infolib.html

Review the enhancements and updates delivered with each version of Ignite-UX you are using up to the latest version, and then select the most appropriate version for your needs.

The Ignite-UX product can be obtained from the HP-UX release media or downloaded from the Ignite-UX Web site at:

http://www.docs.hp.com/en/IUX/download.html

For more information

The following relevant documents are available online at the HP Technical Documentation Web site at:

http://www.docs.hp.com/

> *Ignite-UX Administration Guide*
>
> *HP-UX 11.0 Installation and Update Guide*
>
> *Release Notes for HP-UX 11.0*
>
> *HP-UX 11i v[1|1.6|2] Installation and Update Guide*
>
> *HP-UX 11i v[1|1.6|2] Release Notes*
>
> *Managing Systems and Workgroups: A Guide for HP-UX System Administrator*
>
> *HP Instant Capacity User's Guide*

Some or all of these documents are available on the Instant Information media and in printed form.

Product information regarding Ignite-UX for HP-UX is available at the HP Software Depot at:

http://www.docs.hp.com/en/IUX/