Informix IDS 9.20: Backup and Recovery Using ON-Bar and SnapRestore Technology

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1. Introduction

This document describes the steps needed to backup and restore data using the Informix ON-Bar utility and NetApp SnapRestore technology. The following steps were used with IDS 9.20 in a Sun Solaris environment. Specifically, the following topics will be covered:

- Infrastructure required to integrate ON-Bar and SnapRestore.
- Description of Snapshots and SnapRestore.
- Overview of Storage Managers.
- Integrating ON-Bar and SnapRestore.

2. Audience

This paper is intended for DBAs, system administrators, system engineers, and those with a good understanding of Informix, including the terminology used in this paper. All examples in this report are used on a Sun Solaris, version 7 machine. You may need to modify certain environment variables for your version of UNIX. This paper assumes that all necessary Informix directories, files, executables, etc. are already on the filer.

3. Infrastructure

The following items are necessary when using IDS 9.20 on UNIX with a NetApp filer

- NetApp filer using Data OnTap version 5.3 or higher.
- Network connections.
- Informix group and user accounts.
- Informix Storage Manager (ISM), or other Informix supported storage manager.
- NFS mount point on the filer, and NFS license.
- SnapRestore license code.
- (Suggested) Symbolic links on the IDS server pointing to directories and files on the filer.

4. System Requirements

Prior to using ON-Bar and SnapRestore, you will have to create an Informix user and group. You will also have to establish a filer mount point. You may also want to use symbolic links to map your IDS server directory onto the filer. At this point, Informix should be up and running with the data stored on the filer. For more details regarding these topics, it is advisable to read the following: (http://www.netapp.com/tech_library/3075.html)

You must set the shared memory kernel parameters for your system, regardless of whether you use Snapshots. These parameters are specific just to have Informix running in general, not for backup and recovery. Check the Informix Installation Guide if you are unsure. The settings should be added to the etc/system file.

5. Overview of Snapshots and SnapRestore

A Snapshot is a "read-only", online image of an entire file system, including database files. You can think of a Snapshot as a "freeze frame" at any point in time. This freeze frame version of your file system is called a Snapshot. NetApp filers can maintain up to 255 Snapshots concurrently per volume. Access to Snapshots is available to both Windows and UNIX clients of a filer.

When a Snapshot is created, disk blocks are not copied, but rather, every block in the file system is recognized as belonging to the Snapshot and the active file system. Let's say you have a file called demo1 that is part of a newly created Snapshot. The Snapshot version of demo1 will contain the same contents as the active file system. Until the active file system changes, the Snapshot DOES NOT use any additional space. Regardless of the database size, Snapshots make backup administration simple and time efficient.

Using the SnapRestore command, you can restore your entire database in a matter of minutes. You can revert a particular volume to the original state it was in at the time the Snapshot was taken. Since there is no copying of data involved, an incredible amount of time is saved as the file system is put back to its earlier state.

Note: SnapRestore **CANNOT** be reversed.

An in depth description of Snapshots and SnapRestore is beyond the scope of this paper. More detailed information may be found at (http://www.netapp.com/tech_library/3002.html)

6. ON-Bar Technology

ON-Bar is the backup and restore utility used with IDS 7.21 and higher. Some of the features include:

- High speed parallel backups and restores at the storage space level.
- Point in time recovery of the instance.
- Continuous backups of logical logs.
- Supports XBSA Interface to communicate with ISM and third party storage managers.
- Capable of backup and restores of whole systems and/or selected storage spaces.

With ON-Bar, you can create copies of the server data, and then at some point in time, you can restore the copy, if the original data becomes corrupted for whatever reason. No operator is needed during backup or restore, as user prompts are not required, thus no special programming is needed during unattended operations.

You should backup each logical log as soon as it fills up. In the ONCONFIG file, set the ALARMPROGRAM parameter to **log_full.sh.** This will allow for automatic logical log backups. You need to specify the full path in the ONCONFIG file.

If the Informix software is located in /demo/informix, the following is used:
ALARMPROGRAM /demo/informix/etc/log_full.sh

If you do not want automatic backups of your logs, you can:

- Set the ALARMPROGRAM to **/demo/informix/etc/no_log.sh**
- Leave the ALARMPROGRAM parameter blank for IDS versions 9.2 and greater.

To ensure that ON-Bar always has a free log for use, in the ONCONFIG file, set the parameter **LBU_PRESERVE** to 1.

6.1. Backing Up and Restoring

To backup dbspaces and logs, the following can be used:

onbar -b

onbar -b -l

For restores use:

onbar -r

See the Informix Backup and Restore manual for more details on how to set the parameters and commands listed above.

7. Storage Managers

In order for On-Bar to perform backups and restores, a storage manager must be present. Informix Storage Manager (ISM) was intoduced with IDS 7.3. It is used for receiving backup and restore requests from On-Bar. ISM automatically gets installed when you install your Informix server.

Third party storage managers certified by Informix will also work, including those from from HP, IBM, and others. The storage manager must comply to the XBSA standard. Contact Informix for a list of supported storage managers.

8. Using ON-Bar, Snapshots and SnapRestore

8.1 Overview

When using On-Bar in conjunction with NetApp Snaprestore, you can have instant backups and restores no matter what size database you are using. The environment we are talking about is one in which the Informix "chunks" are installed on one volume. This enables you to easily manage the restore process in a streamlined, timely, efficient manner.

8.2. Online, Instant Physical Backup

To create an instant backup (snapshot) while Informix is up and running, you must use an Informix feature called the External Backup or Blocked checkpoint. Basically, you want to put your Informix instance in backup mode, rsh the Snapshot command to the filer, then take Informix out of backup mode. You can do this with the following script:

```
#/usr/bin
onmode -c block
rsh filer snap create db_vol snap_shot_name
onmode -c unblock
#end of script
```

The onmode -c block command causes Informix to flush all buffers to disk, while still holding onto the newly modified buffers. This will create a completely consistent database image on the actual disks.

The "rsh filer snap create db_vol snap_shot_name" tells the filer to create a snapshot of the database volume. This snapshot process should only take a few seconds

The onmode -c unblock command tells Informix when to restart disk flushing.**Note:** Between the time of the first onmode and the second onmode, some users will notice hang time. However, this hang only lasts long enough for the filer to take a Snapshot, which amounts to a very short time. You can create up to 255 seperate Snapshots of the database volume that you can restore from when needed.

8.3. Restoring the Database from a Snapshot

In order for Informix to be able to roll forward its logs, the logs MUST be backed up using the On-Bar Utility. You may need to perform a full restore of the Informix instance due to a system failure. The first thing you want to do is salvage the current logical log. You can do this with the following command:

onbar -l -s

Once this has completed, you can revert the entire filesystem back to the time the snapshot was taken with the following command:

rsh filername vol snaprestore vol_name -s snapshot_name

The Snaprestore should only take a few seconds. Once finished, you can initiate logical recovery using ON-Bar. You will know when the SnapRestore process has completed because the NFS mount points will become accessible again. To initiate logical recovery, issue the following command:

onbar -r -e

At this point, ON-Bar will look at all the dbspaces and decide which logical logs it needs to roll forward. It retrieves the logs from the storage manager (ISM or whatever you are using). Once ON-Bar finishes the logical recovery, the Informix engine will be left in a quiescent (single user) mode. At this time, you can bring the engine to online mode using **onmode -m.**

9. Conclusions

With the use of NetApp Snapshots and SnapRestore technology, you can backup and restore your database in a few minutes regardless of the size of your database. With ON-Bar, you can

perform unattended operations without any special programming; run parallel backup and restore activities; and have continuous backups of your logical logs; all leading to a point in time recovery of your instance. Using On-Bar with Snapshots and SnapRestore, you can solve your Informix backup and restore problems. It does this by looking at the data and retrieving the necessary logs from the storage manager and rolling them forward.

ON-Bar also works with other third party storage managers from IBM, HP, etc.. **NOTE:**The author of this paper has not tested ON-Bar using any of the above mentioned storage managers, and therefore, cannot recommend one over the other. Contact your local vendor and Informix for more details.

10. Caveats

Informix supports the use of network attached storage only in the context of Network Appliance filers. In addition, Network Appliance has only tested the above configurations in a Sun Solaris environment. While Informix has tested the use of NetApp filers on HPUX and various customers are using other flavors of UNIX, you may need to alter your environment settings, configuration parameters, etc. These alterations may change the procedures needed to accomplish the goals/objectives as outlined in this paper. If you experience any problems making these techniques work, please contact the primary author of this document.

11. Revision History

Date	Name	Description
7/2000	Ed Sassi	Creation
4/16/2001	Ed Sassi, Maury Tiller	Update