

# **RFC Linux Transition Team Technical Report**

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# RFC Linux Transition Team Technical Report

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# **RFC Linux Transition Team Technical Report**

## **Introduction**

Current AWIPS plans call for all NWS offices, including the River Forecast Centers (RFC), to receive Linux workstations to replace their HP-UX workstations in FY03. In preparation for the transition, all hydrology software delivered by the Hydrology Laboratory (HL) to AWIPS has been ported to run under Linux and distributed beginning with AWIPS Release 5.2.1. The data server (ds) and application server (as) machines will not be replaced until at least FY2005. RFCs need guidelines on how to transition their operations to Linux to take advantage of the enhanced processing times seen by NCRFC and ABRFC in their work to port operations to Linux for the Advanced Hydrologic Prediction Service (AHPS) (NCRFC) and RFC backup (ABRFC).

## **Background**

### **Team**

The Linux Transition Team (Appendix A) was formed to document plans and guidelines for transitioning RFC operations into the Linux operating system environment. The creation of a team was suggested at the June, 2002 Hydrology Science Conference and formed under the RFC Development Management process. The team began work in July, 2002 and conducted periodic conference call meetings and email exchanges to produce two reports:

RFC Linux Transition Team Technical Report (this report)

RFC Linux Transition Team Findings and Recommendations Report

### **Scope of the Reports**

This report is focused on the technical details of how to transition RFC operations to the Linux environment. It deals mainly with transition issues for the AWIPS delivered hydrology software. This includes the Operational Forecast System (OFS), Calibration System (CS), Ensemble Streamflow Prediction (ESP), and Flash Flood Guidance System (FFGS) of the National Weather Service River Forecast System (NWSRFS), Multisensor Precipitation Estimation (MPE), and the WFO Hydrologic Forecast System (WHFS). It also addresses porting local applications to Linux and running them in a mixed HP-Linux environment.

The second report contains the findings, recommendations, and additional background information aimed mainly at the AWIPS program. It deals with hardware and COTS software issues under control of AWIPS.

### **National Weather Service River Forecast System (NWSRFS)**

A major impetus for the creation of the RFC Linux Transition Team was the NWSRFS database. NWSRFS, the main RFC hydrologic forecasting software, relies upon a

custom binary flat file database. One disadvantage of the custom binary database is that it is hardware dependant. Binary file storage differs on PC and HP-UX Workstation hardware. The primary byte, the one which denotes the type of data being stored (the big endian) for any binary data is placed at opposite ends of the data on the two platforms. So binary data written to a PC (Linux) platform cannot be read by a workstation application unless the endians are flipped. This problem is referred to as the “big endian – little endian problem”. [Note that throughout this paper, the term “Linux environment” is often used to refer to the PC hardware environment, while HP-UX is used synonymously with the Workstation architecture.]

This problem is easily solved if the binary data files are all of known format and if there are only a few different file formats. However, within the NWSRFS there are over 15 different file formats, and not all of the formats are fixed. The files have no known format; they are merely binary dumps of float arrays into which have been packed, floats, integers and character variables. Each data element must be interpreted and then, once the data type is known, can be converted.

The Hydrology Laboratory (HL) investigated three options for how to deal with this issue in the AWIPS timeframe to port NWSRFS to Linux. They chose to port all NWSRFS to the Linux system and require a Linux version of the custom database be recreated at each site. To run NWSRFS operationally on Linux, one must use Linux executables and a Linux database - Unix executables cannot be used to interact with a Linux database or vice versa. Further documentation of this issue is found in the RFC Linux Transition Team Findings and Recommendations Report.

## **Hardware**

There are two potential hardware configurations the RFCs may deal with in the next year or two. Most will have the official AWIPS mixture of HP and Linux hardware and a few RFCs may acquire a supplemental hardware suite to improve their computing power for AHPS. This AHPS hardware would be attached to the AWIPS network.

### **Linux - HP mixed environment**

With the currently planned AWIPS Linux deployment, the data servers will continue to be the primary file server for RFC applications. Hydrologic applications differ from most meteorological applications in that the hydrologic databases are read/write databases, with forecasters making frequent updates to the databases which must be shared with many other forecasters. Consequently, a shared set of files stored on a single server is required for the RFC applications. For the meteorological applications, there tends to be more read only data and this data can be effectively multi-cast to each of the workstations.

The RFC applications would benefit from the addition of a Linux server to the AWIPS hardware suite and this possibility is being investigated with the AWIPS program (see

the RFC Linux Transition Team Findings and Recommendations Report for further details). The transition instructions in this document assume the availability of sufficient Linux disk space. The disk space must be available in a hardware failover situation when used in operations - in other words, it must be mirrored or fault tolerant.

Another piece of the mixed HP-Linux environment is the current recommendation for the Linux workstations to retain the HP Xterminals as the third head in the nominal AWIPS three-headed workstation. This approach will mean that the HP Xterminal will be hosted by (or boot from) its associated Linux workstation.

In many cases, RFCs have physically separated the Xterminals from each workstation to allow additional access points to the AWIPS system. In the current configuration (HP Xterminal hosted by HP workstation), the Xterminals are capable of executing any application which can be run on a workstation. Based on experience at NCRFC with the proposed configuration, some hydrology application displays (i.e. IFP or MPE) on the Xterminals will be degraded because not all colors are available to the applications. This problem is being investigated by OST and is included in the RFC Linux Transition Team Findings and Recommendations Report.

### **Linux cluster environment**

The NCRFC has been involved in testing and utilizing a prototype system in support of processing requirements of AHPS. This system was designed and delivered by the AWIPS Program Office, in order to improve the runtimes of operational AHPS jobs to acceptable levels.

The prototype Linux Cluster consists of the following:

- 5 rack mounted dual-processor Pentium based processors running Red Hat 7.1
- HP Procurve switch - for internal non-routable network of the cluster
- Network Appliance NetFiler - network attached storage, hot swappable raid
- Quantum DLT 8000 - high speed 80Gb tape backup for NetFiler

The current configuration of the Cluster, has one of the system nodes designated as the main controller, with another serving as backup. The remaining nodes are available as computational resources to the cluster. Current software design limits the utilization of the cluster environment, therefore, the main cluster controller is the only system in regular use, and serves as a Linux Application Server for Hydrologic applications. The NetFiler provides the disk space for Linux usage; /awips/hydroapps/lx and /home are physically located on this device, and mounted on each of the Linux workstations, as well as the Cluster.

Development is underway on a modified file locking mechanism for NWSRFS which should allow multiple and simultaneous execution of NWSRFS / OFS jobs. This will provide the first opportunity for utilization of additional nodes in the Cluster. Initially, it is

expected that this will be limited to a batch queuing environment, where jobs will be submitted to a manager which will submit jobs to the appropriate job queue. The queuing mechanisms are such that jobs will be able to be routed to nodes with available processing.

Future development is anticipated to parallelize the NWSRFS in order to provide additional computational efficiencies, and to further reduce the runtimes of computational intensive programs such as ESP.

Future plans are for delivery of cluster environments to all RFCs. However, these systems are intended to supplement the basic AWIPS system for AHPS and their delivery is subject to AHPS funding constraints.

### **Operating System**

The operating system for AWIPS has been upgraded to Red Hat Linux, version 7.2 from 7.1 for AWIPS Release 5.2.2. The programs and scripts compiled and tested in a 7.2 environment will be delivered in AWIPS Release OB-1.

### **User Environment**

The user environment is provided by the AWIPS software builds. No unique RFC requirements have been identified which are not met by the user environment provided with AWIPS build 5.2.

The user's "hydroapps environment" is intended to provide the same functionality regardless of whether the user is logged on an HP system or a Linux workstation. In order to make this possible, the following considerations should be made when setting up user accounts for Linux workstations.

The home directory can be mounted so that it is available to both HP and Linux systems. If this is done, users must be aware of the environment they're in when running executables in their home directories. Many of the changes necessary to create the correct hydroapps environment on a Linux workstation have been included in the common awips.profile file, which is now located in /awips/hydroapps/lx/public/bin/awips.profile.

The approach to setting up the hydroapps environment for nwsrfs on Linux makes two key assumptions:

- 1) The .profile file run when a user logs into a Linux workstation sources the file /awips/hydroapps/lx/public/bin/awips.profile
- 2) Most tokens in the user's .Apps\_defaults file are defined relative to the token apps\_dir. The only exceptions to this rule are for those "WHFS" applications whose Linux executables are contained under /awips/hydroapps rather than /awips/hydroapps/lx. (See the Directory Structure section for more information.)

These assumptions are crucial to our approach because on a Linux system, within the awips.profile file the value of the apps\_dir token is changed to reflect the Linux file hierarchy ( /awips/hydroapps/lx ). When a user logs in to a HP-UX system, the apps\_dir token defaults to the standard file hierarchy ( /awips/hydroapps ).

Therefore, it is incumbent upon users or system administrators to make sure that all user accounts are compliant with these assumptions in order to use the nwsrfs applications on Linux systems. Beginning with Release OB1, the default profile (/etc/profile) will automatically source /awips/hydroapps/lx/public/bin/awips.profile, so user accounts should not have to do this separately.

Changes to the common .profile include:  
disabling commands which are invalid under Linux,  
changing the apps\_dir value to "/awips/hydroapps/lx",  
changing the fortran\_stderr value to 6  
and changing the home\_files\_workstation token (see below).

Changing the home\_files\_workstation token:  
The home\_files\_workstation needs to be different for the Linux machines. It needs to be set to the server where your linux files are located. The awips.profile file delivered in this release for the linux workstations can be used to set this token.

## **AWIPS Environment**

### **Directory Structure**

The hydroapps directory structure for Linux reflects two different philosophies: the approach for the RFC-only applications (hereafter referred to as "NWSRFS") and the WHFS, precipitation processing system (including MPE), and shefdecode applications (referred to as "WHFS") that run at both WFOs and RFCs. This section includes the identification of the file locations of both systems, but it is important to realize that proper setup of the .Apps\_defaults tokens should allow all applications to work correctly.

The WHFS approach is to retain the same directory structure under /awips/hydroapps and place the new Linux binary executables in the same directory and differentiate between the two versions by appending an appropriate suffix (.lx or .hp). The run or start script for each program determines which version of the executable should be run and sets any other parameters which are dependent upon the platform.

The NWSRFS approach defines a different directory tree, /awips/hydroapps/lx, to contain the files needed to run in the Linux environment. This filesystem includes both the executables as well as the data files, such as the fs5files directory. This approach



allows the Linux files to be easily located and mounted from a different disk system than the HP software.

The two different approaches result in several possibly confusing situations. For instance, the directory /awips/hydroapps/public/bin may contain the executables, get\_apps\_defaults, get\_apps\_defaults.HP and get\_apps\_defaults.LX. If all three files are there, the files get\_apps\_defaults and get\_apps\_defaults.HP are both HP versions of the executable and should be identical. Any other binary executable files in that directory can be assumed to be HP versions. In directory /awips/hydroapps/lx/public/bin, the executable get\_apps\_defaults, as well as any other binary executable in the directory, is strictly the Linux version.

### **Mount points**

In the standard AWIPS configuration, the /awips/hydroapps/lx file system will continue to exist on the DS disks. The Linux workstations should come configured to mount the /awips/hydroapps partition as the HP workstations do. Experience has shown that it is desirable for performance reasons to locate the Linux versions of data and executables on a Linux system, so the Linux Transition Team has requested separate disk storage space for the /awips/hydroapps/lx file system be allocated on a Linux system prior to the replacement of the DS machines running HP-UX with Linux systems. If this request is granted and a partition for /awips/hydroapps/lx is created on a Linux system, the systems will need to be reconfigured to access that partition. See the RFC Linux Transition Team Findings and Recommendations Report for more details.

### **Informix**

For the immediate future the Informix engine will continue to reside on the HP data server. However, as the RFC applications stabilize on the Linux workstations, the issue of moving Informix (or some other relational engine) to Linux will become important. However, because many other applications use the Informix engine, the transition plan for the relational database will be developed in conjunction with the AWIPS program and other development offices as appropriate.

### **Backups**

The Linux workstations are not equipped with a device to directly backup the local disk storage. The current plan for dealing with a disk failure or workstation replacement is to provide the capability for a site to make a disk image of the workstation image and store that copy using the writeable DVD device on the RFC archive machine to be delivered to the RFCs in the AWIPS Release OB1 timeframe. AWIPS will provide the script and software for making the disk images.

### **Disk space and failovers**

As mentioned earlier, the Linux Transition Team has recommended to AWIPS that additional Linux disk space be made available for the RFC transition of operations to

Linux (see the RFC Linux Transition Team Findings and Recommendations Report). This would hold all Linux executables and data needed for RFC operations and could be mounted for use on all Linux workstations. There is not enough disk space on the current HP systems to host all the needed data and there is a performance degradation when it is not hosted in the Linux environment. The data on this new Linux disk space must be redundant so it is available in the event of a failover. The redundancy may come from disk mirroring or RAID strategies.

## **Operational Application Transition**

### **Application distribution**

Until the ds machines are replaced, all RFCs will be running in a mixed HP-Linux environment so various tasks will need to be run in the HP and Linux environments.

It is assumed that at most RFCs the various background and cron managed tasks are executed on the active DS, and that batch jobs are remotely executed on the DS. It is also assumed that we do not current utilize the AS for any Hydro specific processing.

With Linux, and the lack of a designated Linux DS, we must decide where the cron managed tasks will be executed. The crontabs from NCRFC in Appendix C show that in our case, all of the hydro-related “oper” task which are not Informix database specific, have been moved to the Linux cluster. The RFCs have received permission from the AWIPS program to run their Linux cron on the new px-preprocessor machines so the appropriate file systems must be mounted on that machine.

An RFC could also choose to run their cron on the operational lx workstations. It is suggested that if the Linux workstations are used, it would be desirable to split the load around the systems. This would prevent any one system, which presumably is also utilized by login users, from being overloaded. NWSRFS tasks could be run on one workstation, while MPE/Stage3 tasks run on another.

Also, the transition of the archive scripts for the Database archive group from HL, will need to be coordinated.

### **NWSRFS**

The Hydrology Lab (HL) identified three possible solutions with respect to the transition to the Linux port of NWSRFS. The first was to maintain two databases which would be kept synchronized. The second was to rework the port of NWSRFS to Linux in such a way that it will flip the endians on the fly. The third was to provide the RFCs with an accelerated transition to Linux which requires porting all executables to Linux and creating a Linux version of the NWSRFS custom database files. Additional details on these three potential solutions are in Appendix B.

The Linux Transition Team recommends the Accelerated Transition solution. The Accelerated Transition provides the quickest route to full Linux implementation and the benefits of additional computing power. It is the most cost effective solution because it requires no additional coding except that which is required by the Linux port itself. There are no transitional pieces of code which would consume substantial resources and have only short life spans. NCRFC transitioned to a Linux-only executable environment in April, 2002 and has successfully demonstrated the benefits derived from this strategy.

One consequence of the Accelerated Transition solution is that all the NWSRFS executables must be transitioned from HP to Linux at the same time. The lack of transitional pieces of code to identify the source and endian format of the data require that the executables be run on the same platform. Therefore, when the interactive applications begin running on Linux workstations, all of the batch operations must also be run in the Linux environment. There are a few exceptions to this for operations which produce ASCII files, which are not affected by the endian problem.

### **OFS**

The RFCs will employ the same transition process that was used when they moved from the NAS main frame to the AWIPS HP workstations. The Linux version of the database will be created from information dumped to ASCII files from the HP database, the Linux system and the old system will be operated in parallel for some period, and then the Linux system will be made operational.

#### The OFS Transition Process

The RFCs will follow the path outlined below to transition OFS from the HP to the Linux operating system

- install the NWSRFS on the AWIPS Linux equipment
- rebuild the databases on the Linux machines
- run the OFS data ingest to both the Linux and HP databases
- maintain operations on the HP machines and test the Linux system
- at the discretion of the operational office, switch operations to the Linux system and maintain the HP machines
- move operations to the Linux system

The details of this process are included as Appendix D and D2.

The time each step will take will depend upon the office, the number of local applications that must be ported, and the delivery of the AWIPS Linux hardware.

### **Calibration**

The DATACARD (ASCII format) data sets associated with NWSRFS calibration may be moved over to the Linux file system directly if adequate storage is available. If storage is not available, soft links will have to be established.

### **ESP**

There are two options for porting the historical simulations. One is to run the files through the `convert_espts` conversion utility supplied by HL in AWIPS Release 5.2.1. A second is to rerun the simulations on Linux once the NWSRFS has been installed on Linux. The NCRFC found it to be easier to employ the second option of rerunning the historical simulations.

### **FFGS**

Details on converting the FFGS (which has some of its own database files and reads from the OFS database files) are included in Appendix G.

### **MPE**

In Build 5.2.2 MPE assumes the Stage I data is going to be from an HP. If you are running on a Linux machine, MPE will internally convert the Stage I decoded data so it can be read by the Linux workstation (endian flipped).

There may be problems encountered in accessing some of the files from the Linux workstations, because of conflicts between the assumptions that MPE makes in setting and using the `apps_dir` token and those made by the NWSRFS. Specifically, if the `apps_dir` is directed to `/awips/nwsrfs/lx` for NWSRFS, the MPE and WHFS applications will not be able to be found with the provided startup scripts for those programs. For AWIPS OB1, the national `.Apps_defaults` file is being changed for the tokens `pproc_dir`, `shefdecode_dir`, and `whfs_base_dir` so that the directory path names will be absolute, rather than relative to `$apps_dir`. This change should eliminate the problems encountered in 5.2.2. Any offices which want to run under Linux prior to the AWIPS OB1 release should make the changes described below in their local `.Apps_defaults` file (they can be removed when OB1 is installed). In addition, the MPE programs are able to identify and recognize the format of `xmrg` files (big-endian or little-endian) and switch formats, if necessary. However, the OFS programs (e.g., MAPX) which process the `xmrg` files do not currently have this capability. Therefore, it is important that the MPE programs must run in the same operating system environment as NWSRFS.

Changes to `.Apps_defaults_local` for Build 5.2.2

```
shefdecode_dir      : /awips/hydroapps/shefdecode # main directory location
pproc_dir           : /awips/hydroapps/precip_proc # dir with precip proc exes
whfs_base_dir       : /awips/hydroapps/whfs      # top of WHFS tree
```

### **WHFS**

All WHFS data comes from the Informix database so there are no custom file conversion issues. As mentioned earlier, executables are provided for both HP and Linux in the same directory. The WHFS startup scripts will automatically determine which operating system the user is on and start the correct executable as long as the `apps_defaults` issues described above for MPE are addressed correctly.

## **Local Applications**

Individual offices will be responsible for porting any local applications/scripts from the HP to Linux. It is recommended a catalog of all locally developed applications/scripts be created and a transition plan established.

For porting local Fortran applications, the standard Fortran compiler for AWIPS is PGF90 from Portland Group. The Hydrology Lab has used this compiler to compile all of the Fortran code in AWIPS since Release 20, including the NWSRFS libraries which are made available to the RFCs. This compiler is not shipped automatically with Linux systems and the g77 Fortran compiler which is bundled with Linux, may not work correctly with the NWSRFS libraries. Therefore, AWIPS will provide a license for this compiler to each RFC to allow any local applications which were developed in Fortran to be recompiled to run in the Linux environment. Licenses are now available for the offices who indicated they needed to get started on this on their ports now.

Some tips for porting local applications were compiled by ABRFC and are in Appendix H.

## Appendices

### **Appendix A:** Team members

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John Halquist

Billy Olsen

Bill Lawrence

Adrian Faimon

John Kuhn

Joe Gofus

NCRFC

NCRFC

ABRFC

ABRFC

MBRFC

OCWWS-HSD

OHD

## **Appendix B:** Details of Proposed Solutions to Endian problem for NWSRFS

The Hydrology Lab (HL) identified three possible solutions with respect to the current Linux port. The first is to port the NWSRFS and maintain two databases which are kept synchronised. The second is to port the NWSRFS to Linux in such a way that it will flip the endians on the fly. The third is to port the NWSRFS to Linux and provide the RFCs with an accelerated transition to Linux.

### Dual Database Solution

A Dual Database Solution requires that the NWSRFS be ported to Linux and that a new process be developed to keep a Linux database and an HP workstation database synchronized. This solution becomes difficult because the NWSRFS databases are accessed and updated by multiple users simultaneously. In addition, the order of the updates is critical to successful River Forecasting – model runs must be made in an upstream to downstream order. With multiple forecasters updating different portions of large basins the management of the upstream downstream computational order becomes complex. Substantial design and testing would be required to develop an effective synchronization process.

### Flip on the Fly Solution

The Flip on the Fly solution requires that all the read and write routines used in the NWSRFS be updated to a) determine on which operating system they are running b) flip the endians as required. Because of the unformatted file structure, the on the fly flip would have to take place at a relatively high level – where the records are decoded. Because the flipping would have to take place where the records are understood the number of places where the flipping would be required is large (and unknown at this time). The flipping could not be limited to the few routines where the files are actually read and written. Substantial testing would be required to insure that no database corruption would occur when the flipped records were written back to the database.

### Accelerated Transition Solution

The Accelerated Transition solution requires that the NWSRFS be ported to Linux and that the HL provide rapid support for the accelerated transition to Linux. This solution requires shortening the transition period over which the RFCs will move to the Linux operating system and the support of the AWIPS program to succeed.

## Appendix C: Example cron files from NCRFC

### ds cron file

```
-----  
# Crontab list for WHFS software  
# note that oper crontab times are GMT and depend on TZ setting  
# -----  
#  
# Cleanup files every 8 hours; this does not access Informix.  
#  
01 0,8,16 * * * /awips/hydroapps/rfc/cleanup/bin/Run_Clean 1>/dev/null 2>&1  
#  
# Purge old data from the database daily.  
#  
01 4 * * * /awips/hydroapps/whfs/bin/run_db_purge 1>/dev/null 2>&1  
#  
# Run DecodeHDP, OfsDe & Siipp  
#  
10,25 * * * * /awips/hydroapps/precip_proc/bin/Run_DecodeDPA #1>/dev/null  
2>&1  
#05,20,35,50 * * * * /home/oper/jobs/Run_OfsDe_NC 1>/dev/null 2>&1  
#  
#this will move to Linux in 5.2..2  
12,27,42,57 * * * * /awips/hydroapps/precip_proc/bin/run_siipp #1>/dev/null  
2>&1  
#  
# Run OFS jobs  
#  
#10,40 * * * * /home/oper/jobs/Run_preproc 1>/dev/null 2>&1  
#25,55 13-16 * * * /home/oper/jobs/Run_preproc 1>/dev/null 2>&1  
  
#35 11 * * * /home/oper/jobs/Run_Ofs_mis 1>/dev/null 2>&1  
  
#35 12 * * * /home/oper/jobs/Run_ReadCO 1>/dev/null 2>&1  
#40 * * * * /home/oper/jobs/Run_ReadCO_AIADJ 1>/dev/null 2>&1  
  
#06,36 13 * * * /home/oper/jobs/Run_Ofs_all 1>/dev/null 2>&1  
#  
#15 17 * * * /home/oper/jobs/Run_Ofs_dwoper 1>/dev/null 2>&1  
#15 19 * * 1,4 /home/oper/jobs/Run_Ofs fldwav_co 1>/dev/null 2>&1  
#43 17 * * * /home/oper/jobs/Run_cgroups 1>/dev/null 2>&1  
  
#05,35 11-17 * * * /home/oper/jobs/Run_v5jobs 1>/dev/null 2>&1  
#05,35 00-04 * * * /home/oper/jobs/Run_v5jobs 1>/dev/null 2>&1
```



```

#00 05 * * * /home/oper/jobs/Run_v5_backup 1>/dev/null 2>&1
05 05 * * * /home/oper/jobs/archive_files 1>/dev/null 2>&1

#05 20 * * 2,5 /home/oper/jobs/Run_tsdata 1>/dev/null 2>&1

#
# Run the metar to shef process, mostly around the top of the hour
#
05,13,30,55 * * * * /awips/hydroapps/rfc/dbutils/bin/run_metar2shef
1>/dev/null 2>&1
#
#
#####
###
#
# Send text workstation message to notify FIC to complete tape tasks.
#
# 5 and 35 minutes after 2100 hours, gmt, on Saturdays and Sundays.
# 15 Feb 2002 mmz
#
#####
###
#
05,35 21 * * 0,6 cp /awips/hydroapps/rfc/localapps/backup/MSPWRKBCK
/awips/hydroapps/rfc/data/send 1>/dev/null 2>&1
#
#####
###
#
# minute hour date month dow script
# Where * = All
#   n,n = At those times
#   n-n = Range to do
#
#
# Cron jobs for OH - Shilpa Shenvi
# 30 Nov 1999 mmz
#
# 06 Nov 2001 mmz added the . before the command line to fix script not
running for hrl.
#
#####
###
#
# Per phone call on 18June2002

```

```

# Changing grum.scr, location.scr, and radarloc.scr to only run on the 13th.
#
#min hour date      month
#| / /      /
#| | /      /
# ggrad.scr removed per email of 22 Jul 2002
Informix Table
# 00 07 *          * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/ggrad.scr
1>/dev/null 2>&1
41 08 13          * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/grum.scr 1>/dev/null
2>&1
15 08 *           * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/hdpradar.scr
1>/dev/null 2>&1
04 08 13          * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/location.scr
1>/dev/null 2>&1
06 08 13          * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/radarloc.scr
1>/dev/null 2>&1
02 07 *           * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/vl.scr 1>/dev/null
2>&1

# Turned off per emails 19 June 2002 - mmz 26 June 2002
# 42 22 *          * 2,5 . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeCARRYOVERTar.sh 1>/dev/null 2>&1
# 45 22 7,14,21,28 * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makePRDtAr.sh
1>/dev/null 2>&1
# 27 07 *          * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeSTAGEiiitar.sh
1>/dev/null 2>&1
#
DPA
# Turned on per email of 30 July 2002
13 07 *           * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeSTAGEirawtar.sh 1>/dev/null 2>&1

# turned off per OH email 4 mar 2002 mmz - mpe switch
#11 08 *           * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/siistat.scr 1>/dev/null
2>&1

```

```

#

#
# Cron jobs for OH - Cecile Aschwanden
# 06 Feb 2002 mmz
# Request via email
#
#The following jobs were needed when NCRFC ran stage3
#
# Following turned off 26 June 2002 per email
# mpe is running on Linux.
# 14 07 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeBMOSAICtar.sh 1>/dev/null 2>&1
# 16 07 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeGAGEONLYtar.sh 1>/dev/null 2>&1
# 18 07 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeHEIGHTtar.sh
1>/dev/null 2>&1
# 20 07 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeINDEXtar.sh
1>/dev/null 2>&1
# 22 07 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeLMOSAICtar.sh 1>/dev/null 2>&1
# 13 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeLOCBIAStar.sh
1>/dev/null 2>&1
# 20 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeLOCSPANtar.sh 1>/dev/null 2>&1
# 22 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeMMOSAICtar.sh 1>/dev/null 2>&1
# 24 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeRMOSAICtar.sh 1>/dev/null 2>&1
# 26 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeXMRGtar.sh
1>/dev/null 2>&1
#####
# per email of 25 June 2002
# Turned on for HP - [ these are running dbaccess ]
05 22 13 * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/rwbiasdyn.scr
1>/dev/null 2>&1
05 22 01,06,11,16,21,26,31 * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/rwradarresults.scr 1>/dev/null 2>&1

#

```

```
#####  
##  
#  
# added 13 April 2000 mmz for new job request via email.  
# modified 7 July 2000 mmz per request for running on more days.  
#  
11 04 1,6,11,16,21,26 * * . /home/hrl/cronscripts/set_env  
/home/hrl/cronscripts/manrejectobs.scr 1>/dev/null 2>&1  
# | |  
# \ |  
# \ \  
# min hour date  
#  
#####  
###
```

NCRFC Local

```
#####  
###  
#  
# Program for Brian --> 01Dec1999 mmz  
# Updated 1 Feb 2000 for "Operational" locatation, mmz  
#  
45 09 * * * /awips/hydroapps/rfc/localapps/AFDD/afdd 1>/dev/null 2>&1  
#  
#####  
###
```

NCRFC local

```
#####  
###  
#  
# Check_send_rfc will restart send_rfc as needed.  
# i.e. reboot - bounce - etc - etc. 10aug2000 mmz  
#  
07,23,38,53 * * * * /awips/hydroapps/public/bin/Check_send_rfc 1>/dev/null  
2>&1  
#  
#####  
###
```

Local Verification

```
#####  
###  
#
```

```

# Verf. extraction job to be run daily at about 11 pm central standard.
# 3 April 2001 mmz for AI
#
# added find_data and autofetch for DEF - 07/10/02 mmd
#
05 05 * * * /awips/hydroapps/rfc/localapps/vfy/bin/run_extract 1>/dev/null
2>&1
06 20 * * *
/awips/hydroapps/rfc/localapps/vfy/regional/rvr_verif/bin/Run_find_data
1>/dev/null
2>&1
08 20 06 * *
/awips/hydroapps/rfc/localapps/vfy/regional/rvr_verif/bin/Run_autofetch
1>/dev/null 2>&1
#
#####
###

NCRFC Local
#####
###
#
# post Canadian data - aaxx
# 30 June 2001 mmz
#
15 * * * * /awips/hydroapps/rfc/localapps/smcn/post_smcn.ksh
1>/awips/hydroapps/rfc/localapps/smcn/error_log 2>&1
#
#####
###

```

## Linux cron file

```
-----
# Crontab list for RFC software Linux Version
SHELL=/bin/ksh
PATH=/sbin:/bin:/usr/sbin:/usr/bin:/awips/hydroapps/lx/public/bin
HOME=/home/oper
TZ=GMT
apps_dir=/awips/hydroapps/lx
#
# Times are entered in GMT
#
#####
###
#
# minute hour date month dow script
# Where * = All
#    n,n = At those times
#    n-n = Range to do
#
#####
###
#
# Cleanup files every 8 hours; this does not access Informix.
#
01 6,14,22 * * * /home/oper/jobs/Run_Clean 1>/dev/null 2>&1

#
# Once a month at 3 minutes after the first hour in the month
# copy over the new mpe files
#
# 24 Sep 2002 mmz
03 00 01 * * /home/oper/jobs/cp_mpe_climatologies 1>/dev/null 2>&1

# Radar & precipitation processing

#12,27,42,57 * * * * /awips/hydroapps/rfc/precip_proc/scripts/Run_Siipp
1>/dev/null 2>&1

30 * * * * /home/oper/jobs/Run_convert_stg1

35 * * * * /awips/hydroapps/lx/precip_proc/bin/run_mpe_fieldgen #1>/dev/null
2>&1

01 23 * * * /home/oper/jobs/send1hrqpe00z 1>/dev/null 2>&1
```

```

01 06 * * * /home/oper/jobs/send1hrqpe06z 1>/dev/null 2>&1
45 10 * * * /home/oper/jobs/send1hrqpe12z 1>/dev/null 2>&1
45 18 * * * /home/oper/jobs/send1hrqpe18z 1>/dev/null 2>&1

02 20 * * * /home/oper/jobs/send6hrqpe 1>/dev/null 2>&1

# NWSRFS OFS processing

05,20,35,50 * * * * /home/oper/jobs/Run_OfsDe_NC 1>/dev/null 2>&1

10,40 * * * * /home/oper/jobs/Run_preproc 1>/dev/null 2>&1
25,55 12-15 * * * /home/oper/jobs/Run_preproc 1>/dev/null 2>&1

35 10 * * * /home/oper/jobs/Run_ofs_mis 1>/dev/null 2>&1

06,36 0,12 * * * /home/oper/jobs/Run_ofs_all 1>/dev/null 2>&1

06 13 * * * /home/oper/jobs/send_Run_ofs_all_coe 1>/dev/null 2>&1

29 14 * * * /home/oper/jobs/Run_getmap 1>/dev/null 2>&1

08 14-16 * * * /home/oper/jobs/Run_getmaps 1>/dev/null 2>&1

15 19 * * 1,3,5 /home/oper/jobs/Run_Ofs fldwav_co 1>/dev/null 2>&1
43 16 * * * /home/oper/jobs/Run_cgroups 1>/dev/null 2>&1

05,35 11-17 * * * /home/oper/jobs/Run_v5jobs 1>/dev/null 2>&1
05,35 0-4 * * * /home/oper/jobs/Run_v5jobs 1>/dev/null 2>&1

45 15 * * * /home/oper/jobs/Run_dump_ncep 1>/dev/null 2>&1

00 7 * * * /home/oper/jobs/Run_v5_backup 1>/dev/null 2>&1
05 7 * * * /home/oper/jobs/archive_files 1>/dev/null 2>&1
05 6 28 * * /home/oper/jobs/archive_ahps 1>/dev/null 2>&1

05 20 * * 2,5 /home/oper/jobs/Run_tsdata 1>/dev/null 2>&1

# XNAV processing

57 12 * * * /home/oper/jobs/Run_xnav_utils 1>/dev/null 2>&1
58 12,19 * * * /home/oper/jobs/Run_6hr_xnav_utils 1>/dev/null 2>&1
35 11 * * * /home/oper/jobs/Run_api-co 1>/dev/null 2>&1
15 08 * * * /home/oper/jobs/Run_parms 1>/dev/null 2>&1

```

```

#####
###
#
# minute hour date month dow script
# Where * = All
#   n,n = At those times
#   n-n = Range to do
#
#
# Cron jobs for OH - Heather Friedeman email of 20020401
# 02 Apr 2002 mmz
# 03 Apr 2002 mmz updated for ffg
#
#####
###
#
14 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeBMOSAICtar.sh 1>/dev/null 2>&1
42 22 * * 2,5 . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeCARRYOVERTar.sh 1>/dev/null 2>&1
16 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeGAGEONLYtar.sh 1>/dev/null 2>&1
18 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeHEIGHTtar.sh 1>/dev/null 2>&1
20 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeINDEXtar.sh 1>/dev/null 2>&1
22 08 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeLMOSAICtar.sh 1>/dev/null 2>&1
13 09 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeLOCBIAStar.sh 1>/dev/null 2>&1
20 09 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeLOCSPANtar.sh 1>/dev/null 2>&1
22 09 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeMMOSAICtar.sh 1>/dev/null 2>&1
# changed from
# 45 22 7,14,21,28 * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makePRDtar.sh 1>/dev/null 2>&1
# to per email of 24 May 2002
45 22 2,9,16,24 * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makePRDtar.sh 1>/dev/null 2>&1

24 09 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeRMOSAICtar.sh 1>/dev/null 2>&1
26 09 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeXMRGtar.sh 1>/dev/null 2>&1

```



```

15 08,20 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/copy_ffg_data 1>/dev/null 2>&1
# Turned off per email of 30 July 2002
#13 07 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/makeSTAGEirawtar.sh 1>/dev/null 2>&1
# per email of 30 April 2002
# Turned off per email of 24 May 2002 - [ these are running dbaccess - moved
to DS ]
# 05 22 13 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/rwbiasdyn.scr 1>/dev/null 2>&1
# 05 22 01,06,11,16,21,26,31 * * * . /home/hrl/cronscripts/set_env
/home/hrl/cronscripts/rwradarresults.scr 1>/dev/null 2>&1

#
#####
###
#
# Process the HPC data when the 6-10 day comes in
#
30 23 12-19 * *
/awips/hydroapps/lx/rfc/localapps/cpc/move_CPC_images
1>/awips/hydroapps/lx/rfc/localapps/cpc/cron_log 2>&1

```

## **Appendix D:** Cookbook for porting NWSRFS file set from HP to Linux

The porting of a NWSRFS file set from one computing platform to another involves:

- preliminary setup work on the new platform,
- execute a script containing several 'ofs' commands on the old platform,
- edit and rename the output files from those commands,
- copy the renamed files to the new platform,
- check to ensure a few ofs input files from the HP are on the LX system
- execute a script containing several 'ofs' commands on the new platform.

### 1. Preliminary setup on new platform **[Linux]**

A best practice is to do all defining in an *ofs\_level/* other than oper. When all work is done and checked out, then move files to the oper level. While this is not necessary for the initial definition, it will prevent accidental overwriting of files during subsequent transfers. For our purposes, we will use the *ofs\_level/* new\_oper, and this is the name assumed in the following commands.

On linux system, run:

```
create_input_group new_oper  
create_files_group new_oper
```

Create a unique output directory with the same name.

```
go ofs_output  
mkdir new_oper
```

Copy the HP ofs oper input directories to the oper Linux input directories on the HP

```
go ofs_input (should be /awips/hydroapps/rfc/nwsrfs/ofs/input/oper)  
tar cvf ofs_input_tar *  
put the ofs_input_tar file in Linux disk space in the oper directory  
/awips/hydroapps/lx/rfc/nwsrfs/ofs/input/oper  
tar xvf ofs_input_tar
```

### 2. Dumping the OFS on old platform **[HP]**

On HP system, an input group and output directory are created to streamline these OFS activities.

```
create_input_group linux  
go ofs_output  
mkdir linux
```

The script named **dumpofs**, executes successive ofs commands to dump data and punch stations, areas, basins, segments, etc. Date commands are used to denote the beginning and end of the script execution. This script will generate output files in the /awips/hydroapps/rfc/nwsrfs/ofs/output/linux subdirectory. The file names for the files of interest will follow the pattern “programname\_pun.datetime” (i.e. ppinit\_pun.20021206.145904). Example input files are in Appendix E.

The script file follows:

```
date
echo 'ppdutil: dumpshef'
ofs -p ppdutil -i dumpshef -o dumpshef -u linux -g linux
echo 'ppinit: punch_user'
ofs -p ppinit -i punch_user -o punch_user -u linux -g linux
echo 'ppinit: punch_station'
ofs -p ppinit -i punch_station -o punch_station -u linux -g linux
echo 'ppinit: punch_basin'
ofs -p ppinit -i punch_basin -o punch_basin -u linux -g linux
echo 'ppinit: punch_map'
ofs -p ppinit -i punch_map -o punch_map -u linux -g linux
#activate the following lines if you have mape areas
#echo 'ppinit: punch_mape'
#ofs -p ppinit -i punch_mape -o punch_mape -u linux -g linux
echo 'ppinit: punch_fmap'
ofs -p ppinit -i punch_fmap -o punch_fmap -u linux -g linux
echo 'ppinit: punch_mapx'
ofs -p ppinit -i punch_mapx -o punch_mapx -u linux -g linux
echo 'ppinit: punch_mat'
ofs -p ppinit -i punch_mat -o punch_mat -u linux -g linux
echo 'fcinit: punch_rc'
ofs -p fcinit -i punch_rc -o punch_rc -u linux -g linux
echo 'fcinit: punch_segs'
ofs -p fcinit -i punch_segs -o punch_segs -u linux -g linux
echo 'fcinit: punch_fg'
ofs -p fcinit -i punch_fg -o punch_fg -u linux -g linux
echo 'fcinit: punch_cg'
ofs -p fcinit -i punch_cg -o punch_cg -u linux -g linux
date
```

### 3. Editing and renaming output files

The output files created by the script in step 2 (above) will need to be copied from the output directory on the HP system to the appropriate input location on the Linux system delineated below. Files may have to be edited (see notes below). Editing and

renaming can occur before or after the files are copied. Example input files are in Appendix F.

Output File From	Rename File To	Copy File To
dumpshef		../lx/rfc/nwsrfs/ofs/files/new_oper/shefdata
punch_user	pppun_user	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
punch_station	pppun_station	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
punch_basin	pppun_basin	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
punch_map	pppun_map	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
punch_mape	pppun_mape	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
punch_fmap	pppun_fmap	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
punch_mapx	pppun_mapx	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
punch_mat	pppun_mat	../lx/rfc/nwsrfs/ofs/input/new_oper/ppinit
*punch_rc	fcpun_rc	../lx/rfc/nwsrfs/ofs/input/new_oper/fcinit
**punch_segs	fcpun_seg	../lx/rfc/nwsrfs/ofs/input/new_oper/fcinit
***punch_fg	fcpun_fg	../lx/rfc/nwsrfs/ofs/input/new_oper/fcinit
punch_cg	fcpun_cg	../lx/rfc/nwsrfs/ofs/input/new_oper/fcinit

\*Some ratings that are correctly defined on the HP fileset will not punch correctly. This may be due to stricter interpretation of the input format in ofs releases since the rating was defined. Trial and error fixing is the remedy.

\*\*All RES-J, FLDWAV and DWOPER operations must have INPUT CO added on card 1, columns 23-30 of the Operations Table input for these operations. STAGE-Q operations may punch asterisks (\*) in the carryover fields. This will cause an error when defining. If this occurs, remove the RDCO field and the carryover card from the from the input. This will not occur often and appears to be random. The RES-SNGL punch of STPOOLQ rising card had a 0 instead of an & for the continuation. Replace the 0 with an &.

\*\*\*Remove all END cards except the last one.

#### 4. Additional input files needed from HP to LX

The input hcl files for the ofs jobs of filecrat, filecrat\_hcl, deftype, sasmdb.init, goesdb.init, def.global.tech, def.global.func, network, order, and all your local techniques and

procedures must be copied from the HP system the corresponding location on the Linux system. This will allow you to create and populate a set of NWSRFS fs5files of the same size currently in use on your HP system. If you copied all of your oper input directories from the HP to Linux oper input directories in step 1, you may copy these files from the Linux oper workset. If not, they must be copied as indicated below.

COPY FROM	COPY TO
HP /awips/hydroapps/rfc/nwsrfs or Linux /awips/hydroapps/lx/rfc/nwsrfs	Linux /awips/hydroapps/lx/rfc/nwsrfs
cp ../ofs/input/oper/filecrat/filecrat	../ofs/input/new_oper/filecrat/filecrat
cp ../ofs/input/oper/filecrat/filecrat_hcl	../ofs/input/new_oper/filecrat/filecrat_hcl
cp ../ofs/input/oper/prdutil/deftype	../ofs/input/new_oper/prdutil/deftype
cp ../ofs/input/oper/sasmdb/sasmdb.init	../ofs/input/new_oper/sasmdb/sasmdb.init
cp ../ofs/input/oper/goesdb/goesdb.init	../ofs/input/new_oper/goesdb/goesdb.init
cp ../ofs/input/oper/fcst/def.global.tech	../ofs/input/new_oper/fcst/def.global.tech
cp ../ofs/input/oper/fcst/def.global.func	../ofs/input/new_oper/fcst/def.global.func
cp ../ofs/input/oper/ppinit/network	../ofs/input/new_oper/ppinit/network
cp ../ofs/input/oper/ppinit/order	../ofs/input/new_oper/ppinit/order
cp ../ofs/input/oper/shefpars/shefpars.in	../ofs/input/new_oper/shefpars/shefpars.in
cp ../ofs/input/oper/shefpost/shefpost.in	../ofs/input/new_oper/shefpost/shefpost.in

In addition, copy any local techniques and procedures not listed above to the equivalent location in the fcst subdirectory on Linux.

## 5. Defining of new platform **[Linux]**

The script named **createofs** is executed on the linux platform. It cleans up the directories prior to creating the new fs5files. The script file follows:

```
#
export ofs_level=new_oper
# remove any pre-existing fs5files from new_oper
rm /awips/hydroapps/lx/rfc/nwsrfs/ofs/files/new_oper/fs5files/*
rm /awips/hydroapps/lx/rfc/nwsrfs/ofs/output/new_oper/*
# create new fs5files
ofs -p filecrat -i filecrat -o filecrat -u new_oper -g new_oper
ofs -p filecrat -i filecrat_hcl -o filecrat_hcl -u new_oper -g new_oper
ofs -p prdutil -i deftype -o deftype -u new_oper -g new_oper
ofs -p sasmdb -i sasmdb.init -o sasmdb -u new_oper -g new_oper
ofs -p goesdb -i goesdb.init -o goesdb -u new_oper -g new_oper
ofs -p fcst -i def.global.tech -o def.global.tech -u new_oper -g new_oper
ofs -p fcst -i def.global.func -o def.global.func -u new_oper -g new_oper
# local techniques and procedures
ofs -p fcst -i def.tech.esp -o def.tech.esp -u new_oper -g new_oper
```

```

ofs -p fcst -i def.tech.lstallow -o def.tech.lstallow -u new_oper -g new_oper
ofs -p fcst -i def.tech.modsacun -o def.tech.modsacun -u new_oper -g new_oper
ofs -p fcst -i def.tech.sacsnow -o def.tech.sacsnow -u new_oper -g new_oper
ofs -p fcst -i defproc_fgexec -o defproc_fgexec -u new_oper -g new_oper
ofs -p fcst -i defproc_ahpsesp -o defproc_ahpsesp -u new_oper -g new_oper
#
# populate the files with data from HP
#
ofs -p ppinit -i pppun_user -o define_user -u new_oper -g new_oper
ofs -p ppinit -i pppun_station -o define_station -u new_oper -g new_oper
ofs -p ppinit -i pppun_basin -o define_basin -u new_oper -g new_oper
ofs -p ppinit -i pppun_basin2 -o define_basin2 -u new_oper -g new_oper
ofs -p ppinit -i network -o network -u new_oper -g new_oper
ofs -p ppinit -i pppun_fmap -o define_fmap -u new_oper -g new_oper
ofs -p ppinit -i pppun_map -o define_map -u new_oper -g new_oper
#activate following line if you have mape areas
#ofs -p ppinit -i pppun_mape -o define_mape -u new_oper -g new_oper
ofs -p ppinit -i pppun_mapx -o define_mapx -u new_oper -g new_oper
ofs -p ppinit -i pppun_mat -o define_mat -u new_oper -g new_oper

ofs -p shefpars -i dumphshef -o shefpars -u new_oper -g new_oper
ofs -p shefpost -u new_oper -g new_oper

ofs -p fcinit -i fcpun_rc -o define_rc -u new_oper -g new_oper
ofs -p fcinit -i fcpun_seg -o define_seg -u new_oper -g new_oper
ofs -p fcinit -i fcpun_fg -o define_fg -u new_oper -g new_oper
ofs -p fcinit -i fcpun_cg -o define_cg -u new_oper -g new_oper
ofs -p ppinit -i order -o order -u new_oper -g new_oper
#

```

If you have followed the previous four steps, all the input files for this script should be in the proper location for execution. The output files must be examined for errors, input files corrected and define jobs rerun..... Sample input files are included in the Appendices.

When all jobs have been successfully run, the fs5files have been created.

Note: Most of the define steps run relatively quick on the Linux workstations. If an individual step fails partway through completion it is usually easier and quicker to rerun the entire createofs script after correcting the input file. This avoids the steps of removing the successful stations/data which would be required for subsequent runs.

## **Appendix D2: Setting up OFS data feeds to parallel systems**

There are a couple of methods to get the data to parallel systems.

1. One way is to set up a job run by the cron which copies the "batchpst" input files from the HP to Linux each hour. The script copied only the new files since the last run. Then batchpost can be run on Linux to post data to the Linux OFS databases. This method will capture any and all data and corrections which pass through the Informix database. If corrections are made directly to the OFS data, these data will not be transferred.

[Alternatively you could modify the ofsde script to copy vl2vf.buf to each system, and then kick off a bachpost job on each system.]

Once you are ready to switch to the Linux version of ofsde, you merely reverse the process if you want to continue to keep the HP OFS current.

2. If you are only interested in a less periodic update, you can run a  
PPDUTIL: dumphsf \*-?

for whatever number of days you wish to transfer, then copy the punch to Linux and pars/post directly to OFS. This is probably the best way to do your initial testing, particularly if you need to recreate your files a few times. However once you have a clean Linux system defined, the hourly updates as described above are better.

**Appendix E:** Example input files for dumping ofs on HP system.

**File: dumpshef**                    **Program: ppdutil**  
@DUMPSHEF \*-10 \*  
ALL  
ALL  
@STOP

**File: punch\_user**                **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_USER\_NEW)  
USER  
@STOP

**File: punch\_station**            **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_STATION\_NEW)  
STATION RRSPUNCH(YES) ALLPARM ALL  
@STOP

**File: punch\_basin**              **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_BASIN\_NEW)  
DEGMIN(YES) BASIN PUMAXDEC(4) ALL  
@STOP

**File: punch\_map**                **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_AREA\_NEW)  
AREA MAP ALL  
@STOP

**File: punch\_mape**              **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_AREA\_NEW)  
AREA MAPE ALL  
@STOP

**File: punch\_fmap**              **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_AREA\_NEW)  
AREA FMAP ALL  
@STOP



**File: punch\_mapx**            **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_AREA\_NEW)  
AREA MAPX ALL  
@STOP

**File: punch\_mat**            **Program: ppinit**  
@DUMP PUNCH  
OUTPUT(@DEFINE\_AREA\_NEW)  
AREA MAT ALL  
@STOP

**File: punch\_rc**            **Program: fcinit**  
@PUNCHCHR=@DEF-RC  
@PUNCHRC  
ALLRC  
END  
@PUNCHCHR=END  
@STOP

**File: punch\_segs**           **Program: fcinit**  
@PUNCHCHR=@SEGDEF  
@PUNCHSEGS  
ALLSEGS  
END  
@PUNCHCHR=END  
@STOP

**File: punch\_fg**            **Program: fcinit**  
@PUNCHCHR=@FGDEF  
@PUNCHFG  
ALL  
END  
@PUNCHCHR=END  
@STOP

**File: punch\_cg**            **Program: fcinit**  
@PUNCHCHR=@CGDEF  
@PUNCHCG  
ALL  
END  
@PUNCHCHR=END  
@STOP

**Appendix F:** Examples of input files for defining on Linux system.

**File: pppun\_map            Program: ppinit**  
@DEFINE AREA NEW  
MAP 1845 'LOUTRE RIVER AT BIG' 1845 D2 THIE MDR 1845  
...  
MAP ZUMM5 'ZUMBRO R ZUMBRO FALL' ZUMM5 D2 THIE MDR ZUMM5  
@STOP

**File: pppun\_basin            Program: ppinit**  
@DEFINE BASIN NEW  
BASN(ENGL) 1845 'LOUTRE RIVER AT BIG' (38.8038,91.4921 38.8016,91.5004  
38.7975,91.5046 38.7933,91.5046 38.7913,91.5025 38.7891,91.5004  
38.7871,91.5025 38.7829,91.5108 38.7829,91.5192 38.7808,91.5213  
38.7788,91.5234 38.7766,91.5254 38.7746,91.5275 38.7725,91.5296  
.....  
45.64,96.1 45.61,96.1 45.6,96.09 45.58,96.18 45.55,96.23  
45.53,96.27 45.54,96.32 45.57,96.38 45.57,96.45 45.53,96.45  
45.52,96.44 45.56,96.5 45.59,96.56 45.64,96.57 45.67,96.52  
45.72,96.44 45.76,96.43 45.79,96.43) AREA(590.) ELEV(1100.)  
@STOP

**File: pppun\_fmap            Program: ppinit**  
@DEFINE AREA NEW  
FMAP 1845 'LOUTRE RIVER AT BIG' (38.9 91.6)  
FMAP 1846 'MISSOURI RIVER AT WA' (38.6 91.3)  
FMAP 1847 'MISSOURI RIVER AT ST' (38.6 90.7)  
FMAP ABNI4 'IOWA R NR ALBION 4NW' (42.4 93.3)  
.....  
FMAP Y44M5 'DES M JACKSON' (43.8 95.1)  
FMAP YEN 'SOURIS R ESTEVAN' (49.3 103.6)  
FMAP YRKI2 'BLACKBERRY CR YORKVI' (41.8 88.4)  
FMAP ZUMM5 'ZUMBRO R ZUMBRO FALL' (44.2 92.8)  
@STOP

**File: pppun\_mapx            Program: ppinit**  
@DEFINE AREA NEW  
MAPX 1845X 1845 1845 1845  
MAPX 1846X 1846 1846 1846  
MAPX 1847X 1847 1847 1847  
MAPX ABNI4 ABNI4 ABNI4 ABNI4  
.....  
MAPX WYBNSX WYBNS WYBNS WYBNS  
MAPX WYLM7X WYLM7 WYLM7 WYLM7

MAPX YRKI2X YRKI2 YRKI2 YRKI2  
MAPX ZUMM5X ZUMM5 ZUMM5 ZUMM5  
@STOP

**File: pppun\_mat**                    **Program: ppinit**  
@DEFINE AREA NEW  
MAT 1845 'LOUTRE RIVER AT BIG' 1845 GRID  
MAT 1846 'MISSOURI RIVER AT WA' 1846 GRID  
MAT 1847 'MISSOURI RIVER AT ST' 1847 GRID  
MAT ABNI4 'IOWA R NR ALBION 4NW' ABNI4 GRID  
.....  
MAT Y44M5 'DES MOIN JACKSON' Y44M5 GRID  
MAT YEN 'SOURIS R ESTEVAN' YEN GRID  
MAT YRKI2 'BLACKBERRY CR YORKVI' YRKI2 GRID  
MAT ZUMM5 'ZUMBRO R ZUMBRO FALL' ZUMM5 GRID  
@STOP

**File: pppun\_station**                    **Program: ppinit**  
@DEFINE STATION  
STAN(ENGL) AAKI4 AMES IA 42.02 93.69 0.  
PCPN 24 NORM NMDR D2  
STAN(ENGL) ADAI4 'ADAIR WWTP' IA 41.5 94.64 1360. NUMBER(5286)  
PCPN 24 NORM NMDR D2  
.....  
STAN(ENGL) Y95W3 'EAU CLAIRE 4SW' WI 44.8 91.55 0.  
PCPN 24 NORM NMDR D2  
STAN(ENGL) Y99W3 'NORTH FOND DU LAC' WI 43.82 88.48 0.  
PCPN 24 NORM NMDR D2  
@STOP

**File: dumpshf**                    **Program: shefpars**  
.A 8D3 020304 Z DH12/DUE/PPDR 0.00  
.A 8D3 020305 Z DH12/DUE/PPDR 0.00  
.A 8D3 020306 Z DH12/DUE/PPDR 0.00  
.A 8D3 020307 Z DH12/DUE/PPDR 0.00  
.A 8D3 020308 Z DH12/DUE/PPDR 0.10  
.....  
.A ZUMM5G 020312 Z DH0500/DUE/HGIR 7.61  
.A ZUMM5G 020312 Z DH0800/DUE/HGIR 7.70  
.A ZUMM5G 020312 Z DH0900/DUE/HGIR 7.72  
.A ZUMM5G 020312 Z DH1000/DUE/HGIR 7.73  
.A ZUMM5G 020312 Z DH1200/DUE/HGIR 7.77

**File: fcpun\_rc**                    **Program: fcinit**

```

DEF-RC
ID THBI2 REPL
'THEBES IL      ' 'MISSISSIPPI R      ' 37.20 89.50
E 7 0 713200.00 500.00 INT=LOG
M 300.00 0.00
RF 43.40 M 4301973 '
0.00 50000.60 10.00 110001.32 21.20 243402.92
27.50 347704.19 34.00 498005.97 40.50 717508.63
45.50 982011.75
NWS-ID THBI2
HSA-ID STL
ID CNDN8 REPL
'CANDO ND      ' 'MAUVAIS COULEE      ' 48.43 99.10
E 24 0 387. 387. OFF=1 INT=LOG

```

```

.....
M 1151.00 0.64
2.70 125.00 3.00 269.30 4.00 1197.00
4.20 1470.00 5.00 2697.00 5.30 3250.00
6.00 4322.00 7.00 6015.00 8.00 7881.00
9.00 9903.00 10.00 12070.00 11.00 14370.00
12.00 16800.00
NWS-ID PLLM5
USGS-ID '05247500'
HSA-ID DLH
COMMENT &
'USGS RATING 3.0 VALID 1998.10.01 (BAC) '
END

```

```

File: fcpun_segs          Program: fcinit
SEGDEF
IDENTIFIER MERGERDW 39.60 91.20
TITLE 'MERGER DWOPER'
UPSTREAM SVRM7 HRYM7 MORI2
DOWNSTREAM THBI2
DEF-TS
MORI2 QINE 6 INPUT FPDB
MORI2 QINE
MRSI2LOC SQIN 6 INPUT FPDB
MRSI2LOC SQIN

```

```

.....
WAPSIPINICON R DEWITT LOCAL
MAPX MAP RAIM RUNOFF INFW
DEWI4_AX MAPX LIST F7.2, 6
DEWI4_A MAP LIST F7.2, 6
DEWI4_A RAIM LIST F7.2, 6

```



```

FGDEF
ID MERGERDW
TITLE 'MERGER DWOPER      '
SEGS MERGERDW
ID DEV
TITLE 'DEVILS LAKE      '
SEGS CNDN8  MCTN8  EDEN8  ECTN8  DMSN8  WEBN8  DEVN8  &
      CHNN8  CHRN8  BRIN8  CHCN8  DCBN8
ID M1022DW
.....
TITLE 'WAPSI FLDWAV PROJ  '
SEGS OXJI4_A OXJI4_B OXJI4_C WTLI4_A WTLI4_C WTLI4_B WTLI4_D &
      WTLI4_E DEWI4_B DEWI4_C DEWI4_A OXJI4_AS OXJI4_BS OXJI4_CS &
      WTLI4_AS WTLI4_CS WTLI4_BS WTLI4_DS WTLI4_ES DEWI4_BS DEWI4_CS &
      DEWI4_AS
END
$
$ SPECIAL FG DEFINITIONS
$
SPECIALFG
ID FOX/WOLF
TITLE 'FOX/WOLF      '
SEGS SHAW3  EMBW3  NEWW3  ROYW3  WPCW3  BERW3  OSHW3  &
      OSHW3ROR
ID LONG
TITLE 'LONG RANGE SPECIALFG'
SEGS SPAM5  JDNM5  SKPM5  SAVM5  STPM5URB STPM5  HSTM5  &
      SCFW3  PREW3  RDWM5  REDM5  DURW3  DDGW3  GALW3  &
      WSAW3  MUSW3  STEW3  KELM5  LKCM5  WABM5  ALMW3  &
      BVRM5  FOCW3  WNAM5  LCRM5  LACW3  HKHM5  BRWM5  &
      GENW3  DCHI4  LNSI4  LYNW3  MCGI4  GTTI4  MAQI4  &
      DEWI4  MLII2  WAPI4  GRBI4  SFLM7  AGSI4  BTNW3  &
      RVLW3  DBQI4  GLAI2  BLVI4  SABI4  APRI2  CMMI4  &
      LECI4  RCKI2  MUSI4  NWBI2  PCKI2  KHBI2  OQUI2  &
      GLDI2  BRLI4  EOKI4  MROI2  HARI2  WYLM7  CNZM7  &
      MTCM7  MCLM7  TAYM7  PALM7  NLDM7  TRYM7  OMNM7  &
      ERKM7  NATI2  MURI2  GGYM7  MBRI2  UINI2  HNNM7  &
      SVRM7  LUSM7  CLKM7  CAGM7  HRYM7  1847  MCP12  &
      GRFI2  ALNI2  EADM7  CHSI2  CPGM7
END

```

## Appendix G: FFGS Conversion Directions

HP to Linux FFG migration procedure (contributed by Larry Ellis, NCRFC)

Ensure you have the latest working executables. NCRFC encountered problems unloading and loading current FFG definitions to/from ascii files. Our current versions of ffguid and prodgen, listed on startup, are: ffguid - devl-r23SV - 10/31/02 and prodgen - devl-r23SV - 10/31/02 and zgrid - OB1-r22L - 10/28/02. Contact Services if you have earlier versions, or you might not be able to load ascii definition files.

The following assumes you have the path defined by the **ffg\_scripts** token in your current path, and the appropriate .Apps\_defaults files, tokens, and navigation features in place. It also assumes the following scripts exist in \$ffg\_scripts: **ffg\_c**, **ffg\_p**, and **ffg\_zgrid**. These are simple scripts that merely read the ffg\_rii token setting, and then run the ffguid, prodgen, and zgrid executables from the appropriate bin directory.

A) Unload your current FFG computational and product definitions on the HP: (reference NWSRFS manual VI.3.6A for ffg\_c / ffguid,, and VI.3.6B for ffg\_p, prodgen)

1) **go ffg\_define**

2) **ffg\_c**

Choose **S** - Setup Menu

**A** - Areas

I-list

Enter an appropriate output filename, i.e. **defarea.20021209**

Hit **[enter]** on List from ( 1): and to **(xxx)**: to list everything.

Hit **[enter]** to exit this punch routine.

Hit **[enter]** to return to previous menu

**Repeat** same for as appropriate to your RFC:

**H** - Headwaters

**R** - Runoff Adjust for Grids

**W** - Water Supply

**U** - User Controls

3) **ffg\_p**

Choose **S** - Setup Menu

**P** - Products (PROD)

I-list

Enter an appropriate output filename, i.e. **defprod.20021209**

Hit **[enter]** on **List from ( 1)**: and to **(xxx)**: to list everything.

Hit **[enter]** to exit this punch routine.

Hit **[enter]** to return to previous menu

**Repeat** same as appropriate to your RFC:

**T** - Text (TEXT)

**G** - Groups of Products (GRPP)

**U** - User Controls

4) Transfer the above ascii files to your \$ffg\_define directory on Linux

The following assumes the corresponding NWSRFS software, .Apps\_default files, etc. exist on Linux:

B) Load your current FFG computational and product definitions into Linux: (reference NWSRFS manual VI.3.6A for ffg\_c, ffguid and VI.3.6B for ffg\_p, prodgen)

1) **go ffg\_define**

2) **ffg\_c**

Choose **S** - Setup Menu

**A** - Areas

**a** - add

Enter **1** for **Add at (number):**

Enter **f** for **Enter parameters (f-file [t]-terminal m-menu):**

Enter the appropriate input filename, i.e. **defarea.20021209**

at the **Enter path and/or filename:** prompt. The file should load without errors. You'll see a list of areas defined; chose "m" to see additional entries on the next screen.

Hit **[enter]** to return to previous menu

**Repeat** same for as appropriate to your RFC:

**H** - Headwaters

**R** - Runoff Adjust for Grids

**W** - Water Supply

**U** - User Controls

3) **ffg\_p**

Choose **S** - Setup Menu

**P** - Products (PROD)

**a**-add

Enter **1** for **Add at (number):**

Enter **f** for **Enter parameters (f-file [t]-terminal m-menu):**

Enter an appropriate output filename, i.e. **defprod.20021209**

at the **Enter path and/or filename:** prompt. The file should load without errors. You'll see a list of areas defined; chose "m" to see additional entries on the next screen.

Hit **[enter]** to return to previous menu

**Repeat** same as appropriate to your RFC:

**T** - Text (TEXT)

**G** - Groups of Products (GRPP)



## U - User Controls

C) **Gridded FFG** Reference NWSRFS manual pages VI.3.6E for `ffg_zgrid`, the `zgrid` program, to convert zonal averaged thresh-R parameters to gridded thresh-R parameters. See other NWSRFS documentation or consult other RFC's if your gridded thresh-R is based on the ArcView Thresh-R extension. OHD may also know if the grids may be transferred to Linux with the endian conversion program. If not, follow the procedures to define ArcView Thresh-R values on Linux that you used on the HP. Relax, it should go faster on Linux.

The following assumes your gridded thresh-R is derived from area-averaged thresh-R values.

- 1) Read NWSRFS man pages VI.5.5D-ZGRID 1 through 3. Understand that Part 1, steps 1.1 to 1.6, are/should be unnecessary. Look at your defarea punch file, output in the above step A) 2) of these instructions. They should have thresh-R's defined for each of the periods you issue guidance for (1hr, 3hr, 6hr, etc.) If they don't, then try the steps in part 1.
- 2) Begin with Part 2, and do steps 2.1 through 2.5. The "Execution Menu" below step 2.5 just provides an example of the program interaction in step 2.2.
- 3) run **ffg\_c**
  - 3a) **S** - Setup
  - 3b) **G** - Grid
  - 3c) **f** - file (Note you also have the option to input ArcView thresh-R via the "r" option. Follow instructions for that option in VI.3.6A-Setup-Grid pp 1-2.)
  - 3d) while not explicitly spelled out in VI.3.6A-Setup-Grid, "Response f-file input" on pg 2, the filename you want to enter is **gridro1**, **gridro3**, **gridro6**, etc. When you save the input, the `xhr1`, `xhr3`, `xhr6`, etc., files are created in the `$ffg_files/oper/grrro` directory.

That's it!

## **Appendix H: Tips for porting/compiling applications to Linux** **This appendix was provided by ABRFC**

### NWSRFS

- LINUX is more particular than HP-UX when it comes to format of the definition files. We had several problems with rating and segment definitions because of format. For example, one rating was missing a number in the flood of record. This defined on the HPs, but not on linux.
- By far, the most trouble we had was with obsolete data in the model. This included segments, ratings, areas and basins. For example, when trying to delete obsolete areas, I found the corresponding basins had some how been deleted. I had to create some "fake" basins with the proper IDs, then delete the areas and the "fake" basins.
- Another problem, which I believe was mentioned during one of the conference calls, was stars (\*\*\*\*) showing up in segments when they are dumped. This occurred in carryover mainly with obsolete segments, but it still occurs with the fldwav segments.
- Had to get a new version of create\_bas\_boundry from OH because although other files worked straight from the hps with a conversion ran on them, this file did not.

### Socket Programming

- When setting a port number (e.g. setting a server port of "80" for HTTP) it must be converted from host byte order to network byte order using the "htons()" routine. This did not matter on HP-UX, since network and host byte orders are identical on that platform.

### General Programming

- need to change makefiles/source code for proper library/include files locations

### C programs

- with the gcc compiler we have, strcmp (string compare) with a NULL value as one of the strings does not work

## X/Motif

- did not investigate thoroughly, but it appears there is a difference in the way XRegions work between linux and HP (in p1/p2, the draw snow/remove ap routines only work in linux when you use less than 10 vertices) this is more hardware than software dependent, but colors have to be allocated differently in X depending on the display/video capabilities

## Operating Sys, directories, etc

- We had to use only Red Hat 7.1 and not the newer versions in order for all the OH and Awips stuff to work correctly. Also, it was just a regular RH7.1 install the Awips version that OH sent to us didn't seem to work right and neither did the WES/WRT original install. It seemed that the OH version was just the vanilla base load for a awips linux box in preparation for WES install. (see note on lxrfc\_beta\_20... below)
- After installing RH7.1 we had to use the lxrfc\_beta\_20\_20011106\_tar.Z file to create the correct nwsrfs linux directory structures on the linux box. We then had to use the additional patches and upgrades thereafter to get the box up to speed because these newer patches/upgrades work off the file above and don't themselves create the directory structure for nwsrfs etc. In addition, I had to create some additional directories that still were not created.
- Several problems popped up with us and our backup machine that may or should not be a problem with an "AWIPS" linux box as these probs should already be taken care of within the Awips architecture, However

here they are for consideration:

- \* had to get special permission/access/login with srh for data xfer
- \* had to set up the xmrg/griddata conversion scripts and directory structures for this on both the AWIPS side and the backup pc side
- \* When setting up Informix we had some library not found problems. I had to create some new library directories and create some links to other library files and directories for informix to work right. I have a list but will not include here for brevity.
- \* Several scripts when put on the linux box had to be changed to add a line to source the /awips/hydroapps/public/bin/awips.profile. This file sets up the .Apps\_defaults to use the /awips/hydroapps/lx/.... structure for the linux box as opposed to just /awips/hydroapps/...