

Chameleon Travel System

A Guide to Chameleon Backup

Version 1.0

Revision Information

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Scope

This document is intended as a guide to client system administrators to assist them in the task of backup and recovery of the Chameleon Travel System.

Backups should be taken on a regular basis, preferably at least one every 24 hrs, and may be achieved in several ways. Due to the advent of high speed networks and the cost effectiveness of using online storage for backup, it is commonplace for clients to have a second machine, which may well be a configuration mirror of their live server to each switchover in the event of disaster recovery subject to licensing restrictions. However, the procedures outlined in this manual are equally binding for 'single server' operation, although under these circumstances great care must be taken not to compromise / overwrite live databases.

The daily Backup procedure normally consists of two stages:

- ☀ Copy / synchronisation of live database to backup
- ☀ Archive to removable storage for fire safe / offsite deposit

The de facto standard across the Chameleon client base is now to rsync the databases into the backup/recovery area having the benefit of being differential and therefore fast. Whilst it is strongly recommended that users are denied access to the system whilst this operation is in progress (typically set up as a cron job at 02:00 hrs when the system is unlikely to be under heavy use), in practise, few clients have operational staff working on a 24 x 7 who could carry out these procedures, so these are automated.

It is recommended that the client carries out the following additional procedures to ensure the integrity of their backup solution:

- ☀ Daily verification that any online backup databases have been updated by the previous night's backup by ad hoc reporting and scrutiny of cron logs
- ☀ Monthly verification of removable storage backups via trial restore

Many underwriters are insisting upon offsite storage of recovery media, and it is important that you review your policy details to ensure that you are not in breach of these, and that you are maintaining adequate records to evidence compliance.

Real Time Synchronization of Data

For clients who need to guarantee that they have 24x7 access to their data and 'hot swap' capability in the event of fatal failure of their live production server, we can offer a Thoroughbred inline synchronization tool featuring online logging built into the database manager with remote playback/recovery via i.p. on the mirror server subject to compliance with the manufacturers strict operational requirements. Contact your Chameleon Support Team for further details.

Chameleon Travel System Architecture

What does my Travel System require to remain operational?

Thoroughbred Basic License

The Chameleon Travel System is written in Business Basic, and requires a Thoroughbred Basic Interpreter for your chosen operating system environment in order to work. These licenses are purchased through FCS and come in "fixed user bands" (8, 16, 24, 32, 48, 64, 96, 128 . . .). Migration from one user band to the next is via 'trade-in' of your existing license (against Thoroughbred's published fares sheet – the value decreases from 90% to 10% over a four year period), so care should be taken when initially sizing your requirement to ensure that you purchase the appropriate license for your growth rate, as after 12 months you have already lost 25% of the license value.

Chameleon Licenses

These are purchased by the concurrent session requirements in line with the database policy within the Thoroughbred license. Hence the number of Chameleon sessions you need to open determines not only the level or it's licensing requirements, but are also bound by the database license, so you need at least as many Thoroughbred Basic User Licenses as Chameleon concurrent sessions required.

Operating System

The Chameleon Travel System may be viewed as being 'cocooned' inside the basic environment, so in practise (subject to limitations of Thoroughbred Basic to interact with its environment and peripherals), Chameleon software should work in any environment where Thoroughbred Basic is available.

Today, Chameleon clients are exclusively operating in the UNIX environment, the majority running under Linux and derivatives. With the continual advancement in speed and power of processors and peripherals we believe it is important to keep your operating systems environment up to date, and we ourselves exclusively use Red Hat Fedora Core for our own turnkey system solutions. Care should be taken to ensure that any peripherals that you purchase are supported under your chosen operating system environment, and are ideally 'portable' to a replacement machine in the event of upgrade / disaster recovery

Setup and Maintenance of the Business Basic Environment

The Chameleon Travel software is 'run' by the Thoroughbred Business Basic (BB) interpreter which acts as the interface between Chameleon and the outside world. Connectivity between Chameleon and the outside cannot happen unless the required environment has been setup at run time to achieve the desired links. This is NOT dynamic, so don't expect to attach a new printer to the operating system and for it to be instantly visible and available to Chameleon users in the back office – it doesn't work like that!!

Basic Configuration Files

When you log into Chameleon you will be attached to the Business Basic Interpreter using an initialization file which contains all the relevant parameters for your session at the time of connection (your environment). These are called IPL's, and when your BB is loaded from license media, we by convention load this into the directory /basic on your server, although in practise,

this could be any valid working directory. This is the BB 'Home Directory' and its world revolves around this base point.

In addition to the home directory where the interpreter itself resides, the BB installation will create the directory /usr/lib/basic where the BB security file is held. It is important not to corrupt / delete this file, as without it your BB environment will not work. Your license comes with a unique key (token) which is registered to you. On installation of your license, the system dynamically generates another unique installation code, which combined with your license token is used to generate the "Activation Key" which unlocks your license ready for use to the purchased number of users. If at any stage you corrupt your system / tamper with the security system, then your BB license will automatically revert to three users, and the environment must be re-loaded to regain full user license capability and re-activation through Thoroughbred USA

```
[fcs@chameleon training]$ cd /usr/lib/basic
[fcs@chameleon basic]$ ls -la
Total 48
drwxrwxrwx  2 root root 4096 Sep 16 08:41.
drwxr-xr-x 48 root root 32768 Sep 16 08:40.
-rw-rw-rw-  1 root root 5135 Sep 16 21:44 tbredbas.85
[fcs@chameleon basic]$
```

As the desire for individual users to be presented with access to 'their own subset' or peripherals and maybe even database (multi-company or production / training / End of Year databases) we create our own IPL directory sub-ordinate to the main BB home directory in which we store the IPL profiles for the environments in use for a particular company e.g.

```
[fcs@chameleon ~]$ cd /basic/IPL
[fcs@chameleon IPL]$ ls
fcs temp training
[fcs@chameleon IPL]$
```

Typically in addition to an IPL with your 'company/department name', you will have an FCS or support IPL together with training and maybe even a temp IPL. These hold the key to the vital link between Chameleon and the outside world

The IPL

Whilst we have included examples of these within this documentation as a guide to the professional System Administrators, we would not normally expect an End User to tamper with these files, as it is all too easy to loose access to your system if you do not know what you are doing! If in doubt, please contact your Chameleon Support Team, who will be happy to offer assistance in this area

```
CNF 1, 45, 1, 120, , , , D
PTN 1, 600000
PRM LONGVAR
PRM IF47
DEV D0, 1, , , , , UTILS
DEV D1, 1, , , , , IDL4
DEV D3, 1, , , , , /accounts
DEV D4, 1, , , , , /fares/ground
DEV D5, 1, , , , , /fares/Flights
DEV D6, 1, , , , , /mai n/FILES
DEV D7, 1, , , , , /chamel eon/PROGS
DEV D8, 1, , , , , /chamel eon/FCS_UTI LS
DEV D9, 1, , , , , /accounts/docs
DEV DA, 1, , , , , /pnr
DEV DB, 1, , , , , /mai n/export
DEV DC, 1, , , , , /chamel eon/EDI
PFM LISTPAREN
DEV T0, 5, , , , , tty
DEV TL, 7, , , , , tty1a15
DEV TM, 7, , , , , tty1a16
DEV P1, 4, , 166, 1, 1, , lpr -PP1
DEV P2, 4, , 166, 1, 1, , lpr -PP2
DEV P3, 4, , 166, 1, 1, , lpr -PP3
DEV P4, 4, , 166, 1, 1, , lpr -h -PP4
DEV P5, 4, , 166, 1, 1, , lpr -h -PP5
DEV P6, 4, , 166, 1, 1, , lpr -h -PP6
DEV P7, 4, , 166, 1, 1, , lpr -PP7
DEV P8, 4, , 166, 1, 1, , lpr -PP8
DEV P9, 4, , 166, 1, 1, , lpr -PP9
DEV A1, 4, , 166, 1, 1, , lpr -PA1
DEV A3, 4, , 166, 1, 1, , lpr -PA3
DEV Y1, 4, , , 1, 1, , lpr -PY1
DEV Y2, 4, , , 1, 1, , lpr -PY2
DEV H1, 4, , , 1, 1, , lpr -PH1
DEV M1, 4, , , 1, 1, , lpr -PM1
DEV C1, 4, , , 1, 1, , lpr -h -PC1
DEV FX, 4, , , 1, , , cat >faxdump
DEV X1, 4, , 166, 1, 1, , cat >dump1
DEV X2, 4, , 166, 1, 1, , cat >>accounts
DEV NU, 4, , , , , nul l
DEV G0, 8
DEV G1, 8
DEV G2, 8
DEV G3, 8
DEV G4, 8
DEV G5, 8
DEV G6, 8
DEV G7, 8
DEV G8, 8
DEV G9, 8
IPL 1, 60, T0, FSSTART
END
```

In essence this is the 'map' which controls the Chameleon world.

The DEV 'Dx', 1 line define the directories in the sequence which they are searched when opening files/programs and BB uses FIFO when attaching you to a program / file. By convention, we tend to use DEV D to indicate disks, but it is the, 1 which identifies this to the interpreter.

The DEV 'Px', 4 lines define the printers that are linked into the session, and it should be noted that Thoroughbred Utilities will only show you printers beginning with 'P" although FCS modules will offer you any printer in your IPL. Typically printers are pointing to queues / devices set up

within the Operating System environment, and providing business basic has the necessary read/write permissions to these queues / services, in general can talk to them relatively painlessly.

For further details you should see the Chameleon System Administrators Guide, but it is worthy of note that it is common place to include one / several 'disk' printers in your configuration file

Chameleon Disk Printers

```
DEV FX, 4, , , 1, , , cat >faxdump  
DEV X1, 4, , , 166, 1, 1, , , cat >dump1  
DEV X2, 4, , , 166, 1, 1, , , cat >>accounts
```

If you use the fax / email connectivity within Chameleon, then you will almost certainly have an 'FX' printer in your IPL which is the communication layer between the FCS fax/email script and the system, and as such would not normally form part of you backup stratagem.

Printers X1 and X2 above however, are going to disk files – these have not got a full pathname specified on them, so this tells you that they will be found in the BB home directory /basic. Files preceded by a single chevron are refreshed with use, and those with double chevron are appended with use. If any of the files specified here are in regular use by your accounts department or other uses that export / ftp these elsewhere for manipulation, then these should be considered for inclusion within your backup.

Chameleon Database Directories

These are normally placed directly under the root, but for systems where you wish to hold several individual environments on the live server itself, it is more usual to create a top level folder to hold these in.

Main Database Folders

The above example which has this structure:

```
DEV D3, 1, , , , , /accounts  
DEV D4, 1, , , , , /fares/ground  
DEV D5, 1, , , , , /fares/flights  
DEV D6, 1, , , , , /main/FILES
```

Should be considered for conversion to this:

```
DEV D3, 1, , , , , /producti on/accounts  
DEV D4, 1, , , , , /producti on/ground  
DEV D5, 1, , , , , /producti on/flights  
DEV D6, 1, , , , , /producti on/main
```

Documents and File Transfer Folders

Files which are either temporary or documentation images are held in their separate folders. In the above example these are:

```
DEV D9, 1, , , , , /accounts/docs  
DEV DA, 1, , , , , /pnr  
DEV DB, 1, , , , , /main/export
```

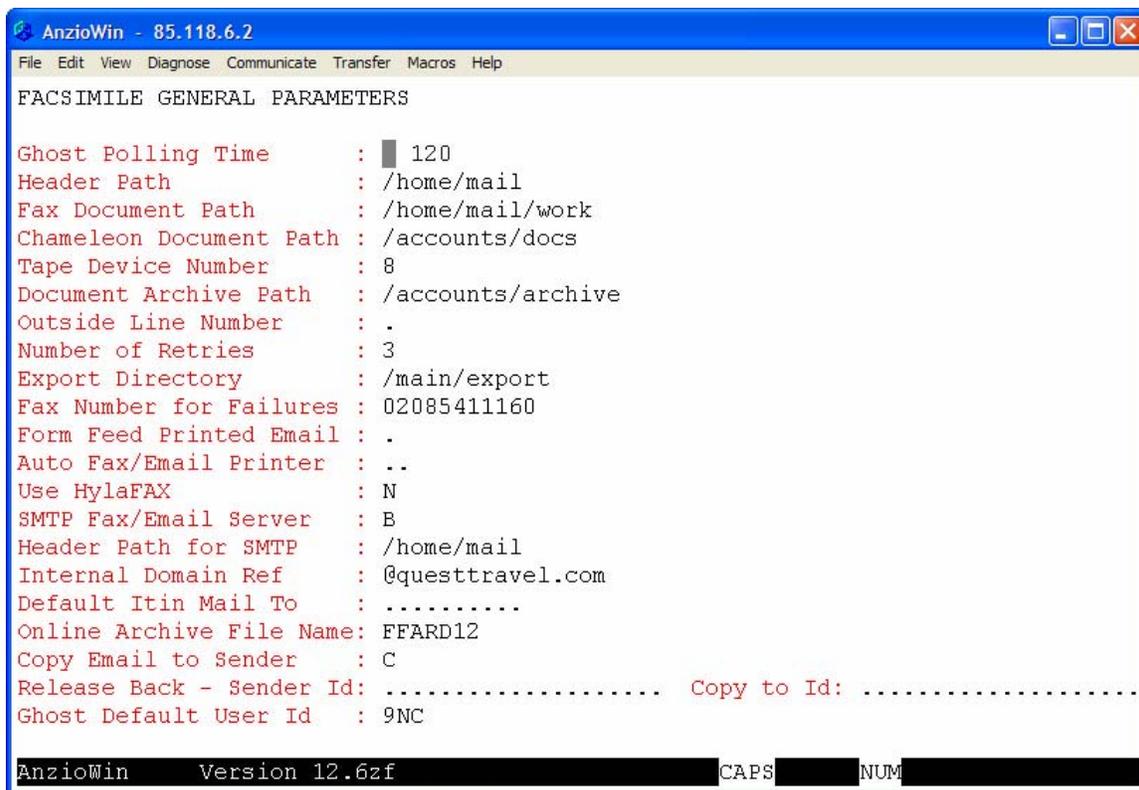
There are typically three main repositories for input / output file transfers, and you will need to decide which of these areas if any you include in your 'automatic' backup cycle, and which warrant 'manual' handling.

PNR files

These are usually left out of the backup cycle, as they are transient, and as such the folder would normally be empty. However PNR's delivered into Chameleon are uploaded into the database by a background task, and if this is accidentally stopped, the directory may well contain PNR's which you required. It should be noted that since this is not the only source of this data (you can re-request the PNR from the GDS)

Export Files

It is usual to have a directory where you place any databases that are being exported from Chameleon to third parties. These may include client and booking file dumps for downstream reporting engines, brochure order / mailing feed files for fulfilment companies or database dumps feeding ecommerce solutions. These would normally be held in an export folder, and as such, as these are outgoing files and should not then have any usefulness to us (except perhaps for re-transmission in the event of failure) should really be regularly visited / purged rather than being backed up.

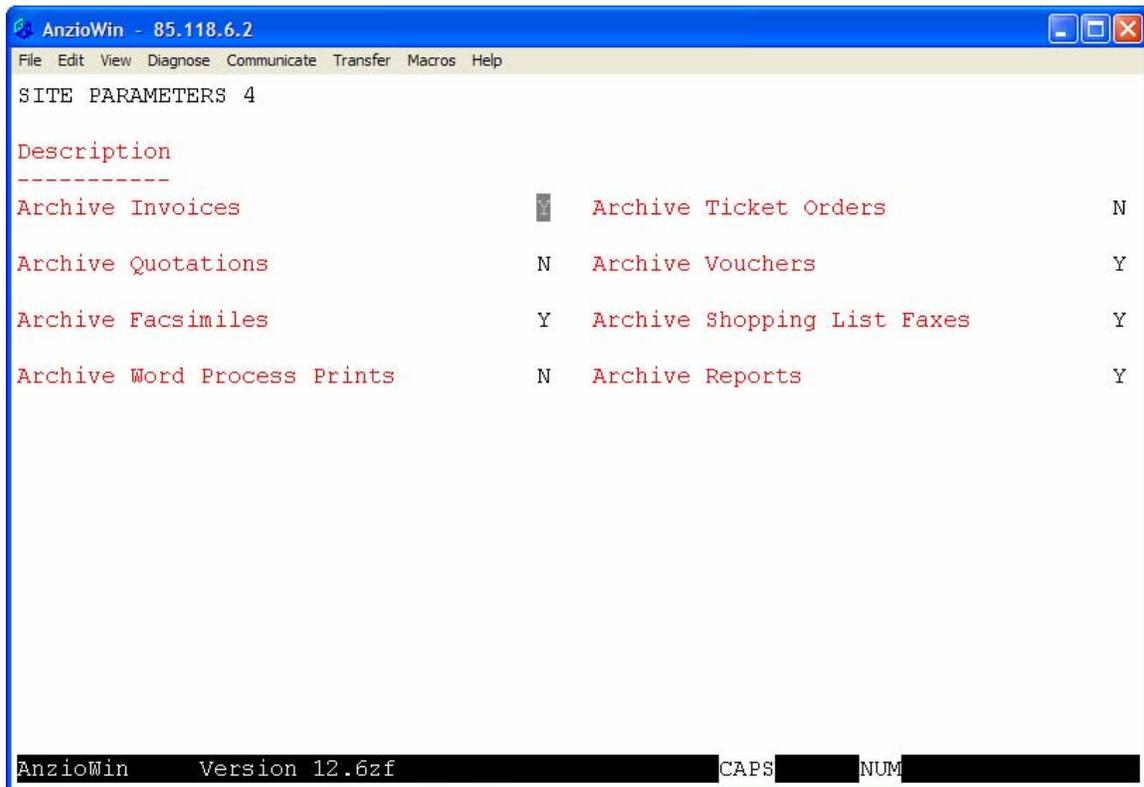


The export directory is defined on the Facsimile General Parameters screen which is usually found off the Site Menu. This panel also defines the default paths for the Fax/Email engine as well as detailing the current Document backup volume

Document Saves

These are configured on Site Parameters 4, and if these flags are set to “Y”, whenever a member of the appropriate document class is created, the output is written to a serial disk file prior to being handed off to the designated printer and the image is retained on disk.

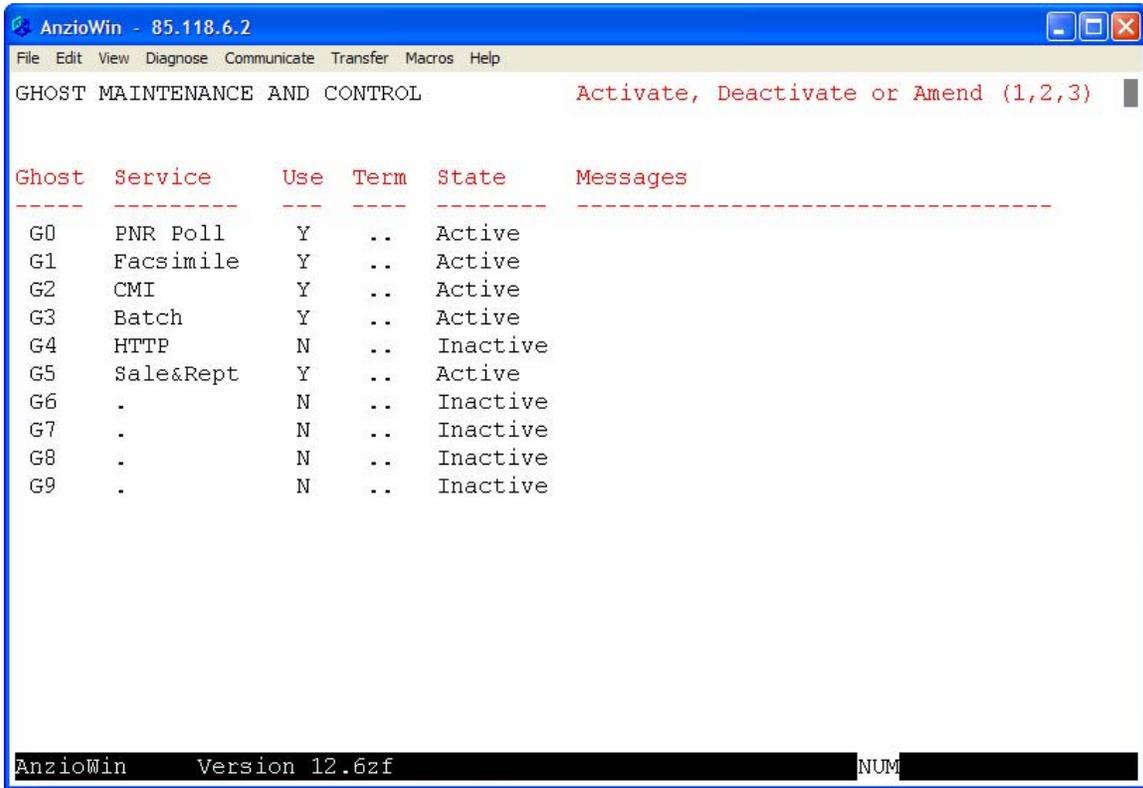
It should be noted that this can generate a large number of serial file images in a busy environment, and unless you are careful, it is easy to build up tens of thousands of documents in one folder which is enough to bring any system to its knees, in the worst case, corrupting your file system



In order to alleviate this issue, FCS created a documents concentrator facility within the documents archive facility (Online Documents Archive) which collects all the small files and writes them away indexed into one single file. The file size has been capped at 2GB being the maximum file size available on older versions of Unix (latest versions this is limited only by the size of the available space), and the archiver automatically closes and opens and creates a new volume when the current file reaches capacity.

These files are labelled FFARDS, FFARD1 . . . FFARD12 being in use in the above example. If space permits, there is no reason why these files should not remain “online” giving you access to all these archived documents, however we would recommend that you additionally archive these off to another location / offsite storage and place the ‘completed’ files in a folder of their own on the production server, which is not subject to daily archive, as the files are passive repositories, and as such, their contents do not change.

How can I check my system is Archiving?

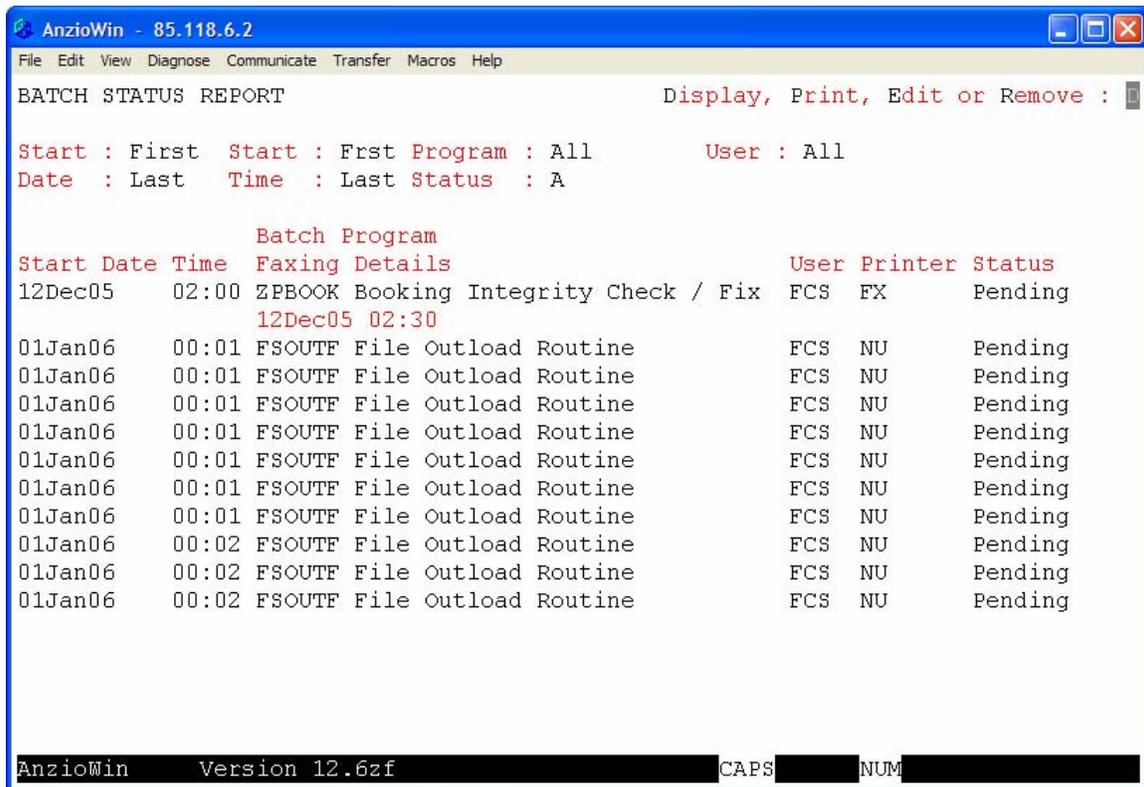


The screenshot shows a terminal window titled "AnzioWin - 85.118.6.2". The menu bar includes "File", "Edit", "View", "Diagnose", "Communicate", "Transfer", "Macros", and "Help". The main display shows "GHOST MAINTENANCE AND CONTROL" with a red prompt "Activate, Deactivate or Amend (1,2,3)". Below this is a table with columns: Ghost, Service, Use, Term, State, and Messages. The table lists tasks G0 through G9 with their respective services and states. At the bottom, the status bar shows "AnzioWin Version 12.6zf" and "NUM".

Ghost	Service	Use	Term	State	Messages
G0	PNR Poll	Y	..	Active	
G1	Facsimile	Y	..	Active	
G2	CMI	Y	..	Active	
G3	Batch	Y	..	Active	
G4	HTTP	N	..	Inactive	
G5	Sale&Rept	Y	..	Active	
G6	.	N	..	Inactive	
G7	.	N	..	Inactive	
G8	.	N	..	Inactive	
G9	.	N	..	Inactive	

The Online Archive program can run in the batch stream, so the first thing to check is whether you have a batch controller running. You do this by going to your System Maintenance Menu and look at Ghost Task Maintenance and Control. In the above example, we can see that our batch ghost is indeed running as task 'G3'

Next we need to go to the Batch Menu, which is usually found off the Site Menu. Here we go into the Batch Status Reporter, and look to see the pending jobs – if we have an archive task scheduled, then we would see this waiting in the pending queue



```
AnzioWin - 85.118.6.2
File Edit View Diagnose Communicate Transfer Macros Help
BATCH STATUS REPORT                               Display, Print, Edit or Remove :
Start : First   Start : Frst Program : All       User : All
Date  : Last   Time  : Last Status  : A

      Batch Program
Start Date Time Faxing Details                User Printer Status
12Dec05    02:00 ZPBOOK Booking Integrity Check / Fix FCS  FX    Pending
      12Dec05 02:30
01Jan06    00:01 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:01 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:01 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:01 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:01 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:01 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:01 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:02 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:02 FSOUTF File Outload Routine        FCS  NU    Pending
01Jan06    00:02 FSOUTF File Outload Routine        FCS  NU    Pending

AnzioWin Version 12.6zf CAPS NUM
```

In the above example, we note that the only operations pending on this site, is the Booking Integrity Checker and some file outloads scheduled for the New Year. We would strongly recommend that the Batch Queue is checked periodically and ensure that either the archiver is running, or that we manually run the program as part of routine maintenance.

```
DOCUMENT HISTORY REPORT                                Display, Print or Purge : d

Type : I      Booking Agent/Client Reference Date      Document : ..
      From : First          C          First   081205
      To  : Last           Last       Last    081205

No  Booking  Client  Agent  User  Date    Time  File           Archive
---  -
01  263033    240598          KSK   08Dec05 11:45  I48997685c    FFARD12
02  267914    242390          QJM   08Dec05 10:57  I45630787T    FFARD12
03  274291    244886          HLG   08Dec05 10:38  I44349538T    FFARD12
04  274291    244886          HLG   08Dec05 11:07  I46340277d    FFARD12
05  274479    232044          KMN   08Dec05 14:13  I59278935Q    FFARD12
06  274479    232044          KMN   08Dec05 14:13  I59289352Z    FFARD12
07  274479    232044          QMT   08Dec05 15:41  I65365741J    FFARD12
08  280673    247696          HLG   08Dec05 11:59  I49943287K    FFARD12
09  280968    247934          QJM   08Dec05 12:28  I51949074N    FFARD12
10  281023    247301          QHD   08Dec05 10:07  I42215278e    FFARD12
11  281228    210455          9TM   08Dec05 12:03  I50226852P    FFARD12
12  282337    248980          9TM   08Dec05 09:49  I40935185G    FFARD12
13  283620    209836          QKD   08Dec05 16:06  I67151621O    FFARD12
14  283881    250134          9TM   08Dec05 09:37  I40068287H    FFARD12

More (Y/N)
AnzioWin Version 12.6zf CAPS NUM
```

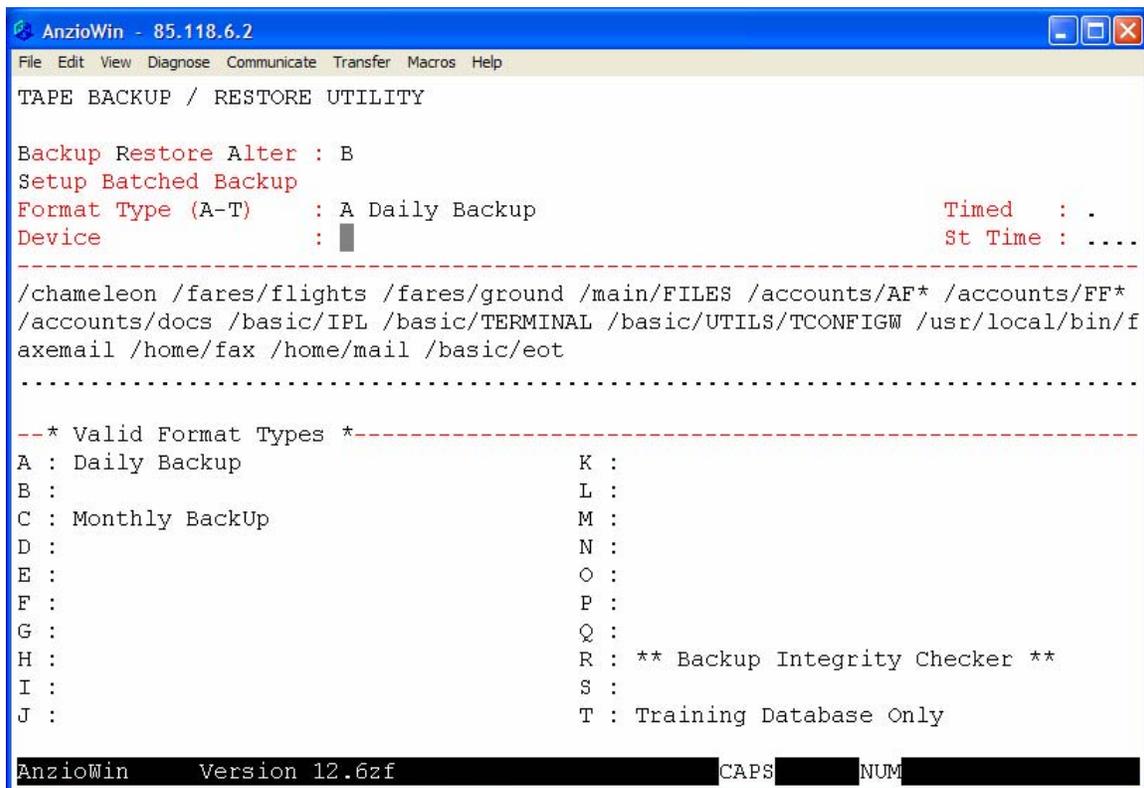
To check whether your system is archiving; you may go into the Document History Report (a.k.a. Document Reprint) and put in yesterday's date. If online archiving is in operation and this has occurred overnight, then we would expect to see documents created yesterday showed as archived in the current file – all the items above have been archived in FFARD12

Backing Up Your Chameleon Travel System

It is the client's responsibility to ensure that their databases are backed up on a regular basis. FCS strongly recommends that you do this on a once a day basis to your chosen media. Your backup and recovery strategy should be discussed with your Chameleon Support team, who will assist you in setting up your procedures and helping you identify that this is working.

For users with little / no systems knowledge, Chameleon has an embedded backup routine which requires you to have tape backup media (DAT, DLT or similar device) attached to your machine. If you are about to purchase this, please consult your support representative who will help you choose a device with sufficient capacity for your needs – it is desirable that you use a media which is capable of backing up all of your data unattended – i.e. on a single volume, as this can be pre-loaded in the system prior to going home at night and submitted into the batch queue to run

Chameleon Tape Backup / Restore Facility



```
AnzioWin - 85.118.6.2
File Edit View Diagnose Communicate Transfer Macros Help
TAPE BACKUP / RESTORE UTILITY

Backup Restore Alter : B
Setup Batched Backup
Format Type (A-T)    : A Daily Backup          Timed : .
Device              : █                      St Time : ....

-----
/chameleon /fares/flights /fares/ground /main/FILES /accounts/AF* /accounts/FF*
/accounts/docs /basic/IPL /basic/TERMINAL /basic/UTILS/TCONFIGW /usr/local/bin/f
axemail /home/fax /home/mail /basic/eot
.....

--* Valid Format Types *--
A : Daily Backup          K :
B :                      L :
C : Monthly BackUp      M :
D :                      N :
E :                      O :
F :                      P :
G :                      Q :
H :                      R : ** Backup Integrity Checker **
I :                      S :
J :                      T : Training Database Only

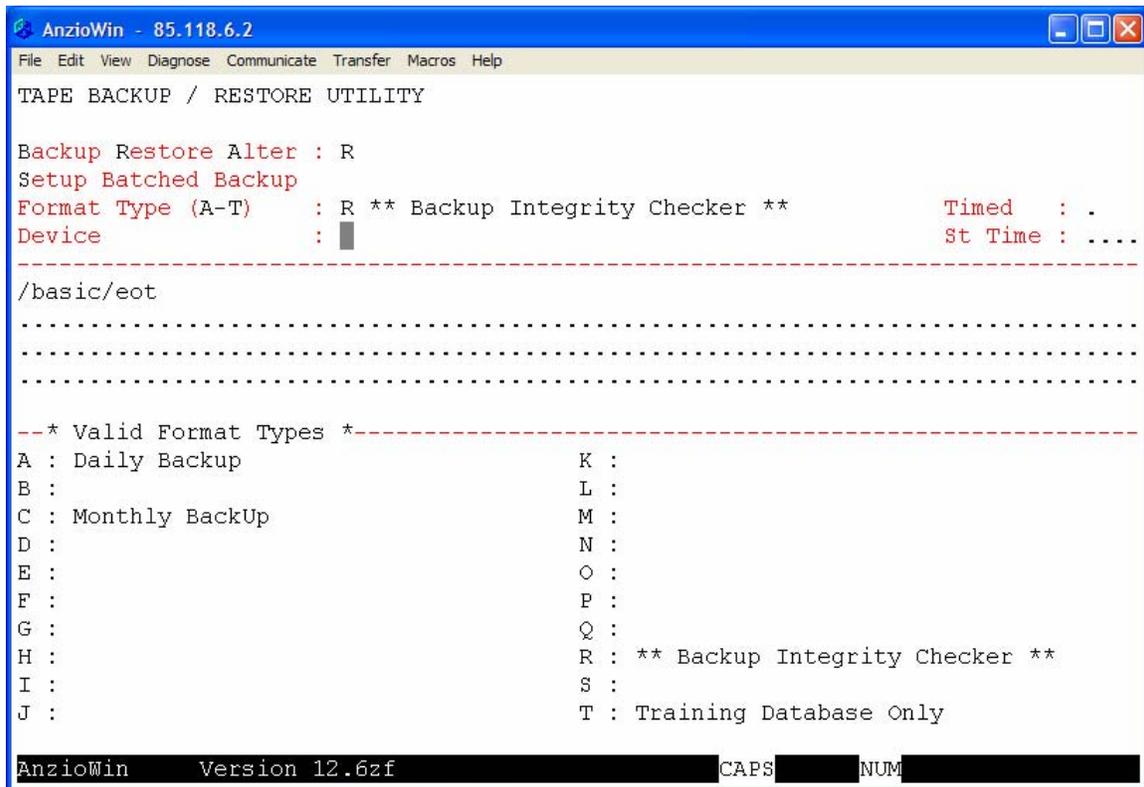
AnzioWin Version 12.6zf CAPS NUM
```

This is found on the System Maintenance menu. You can set up several backup definitions should the need arise, but typically you will need a daily schedule with an optional monthly schedule, and maybe the ability to backup your training environment (if applicable).

Above shows a sample daily run, which backs up everything bar the software on a daily basis. It should be noted that we deliberately place a "single" file onto the very end of the backup, which we use to test the integrity of the backup. Tape backups are "serial recording devices" whereby the only way to determine what are the contents of the tape, is to read it from end to end. If the system can locate / recover the very last file known to be at the end of the tape, then we can be assured that it has read all the files in between, so there is a very high probability that the tape could be used to recover the system in the event of failure.

Hence, if we look at the screen shot below, we can see that the 'Backup Integrity Checker' option in fact is simply a restore of the file /basic/eot, which we know to be on the end of the tape. For users with some operating systems knowledge, we recommend that they review the contents of the tape by doing a tape listing direct from the command prompt in the operating system.

If in doubt, please contact your support representative, who will be happy to assist you in implementing a backup strategy.



```
AnzioWin - 85.118.6.2
File Edit View Diagnose Communicate Transfer Macros Help
TAPE BACKUP / RESTORE UTILITY

Backup Restore Alter : R
Setup Batched Backup
Format Type (A-T) : R ** Backup Integrity Checker **          Timed : .
Device : █                                                    St Time : ....

-----
/basic/eot
.....
-----

--* Valid Format Types *--
A : Daily Backup                K :
B :                             L :
C : Monthly BackUp             M :
D :                             N :
E :                             O :
F :                             P :
G :                             Q :
H :                             R : ** Backup Integrity Checker **
I :                             S :
J :                             T : Training Database Only

AnzioWin Version 12.6zf CAPS NUM
```

Database Synchronization Techniques

For those clients who have second stand-by servers, or are happy to keep an image of their database on the same server as the production environment, it is possible to offer a backup policy which uses operating system utilities to mirror the databases – this uses the UNIX utility rsync, and is a fast simple way to copy your data.

It is common to use this when setting up training databases on live servers, and also production backups on servers where they are on the same LAN or the volume of data is low.

How does synchronization work?

The system examines each file in the 'donor' directory and compares it with that in the 'recipient' directory. If it has changed (different crc coes) then the system will update the recipient database with the new image. It is possible to parameterise this procedure to effect the removal of files from the recipient machine where the file no longer exists on the donor machine but using the - - delete option on the rsync command to achieve this.

Great care **MUST** be taken when using this facility, as to copy the data the wrong way could have disastrous consequences.

Using Synchronization to Create a Training / Backup database

If we take the simplest case where we want to create a training database co-resident on our live server, we first of all take the IPL for the production environment (see above) and substitute in replacement paths that point to where we shall place our copy data. For ease, it is preferable to create all of the database areas under one folder, so that if required, this can be readily backed up

```
CNF 1, 44, 1, 120, , , , D
PTN 1, 600000
PRM LONGVAR
PRM IF47
DEV D0, 1, , , , , UTILS
DEV D1, 1, , , , , IDL4
DEV D3, 1, , , , , /training/accounts
DEV D4, 1, , , , , /training/ground
DEV D5, 1, , , , , /training/flights
DEV D6, 1, , , , , /training/main
DEV D7, 1, , , , , /chameleon/PROGS
DEV D8, 1, , , , , /chameleon/FCS_UTILLS
DEV D9, 1, , , , , /training/docs
DEV DA, 1, , , , , /pnr
DEV DB, 1, , , , , /training/export
DEV DC, 1, , , , , /chameleon/EDI
PFM LISTPAREN
DEV T0, 5, , , , , tty
DEV TL, 7, , , , , tty1a15
DEV TM, 7, , , , , tty1a16
DEV P1, 4, , 166, 1, 1, , lpr -PP1
DEV P2, 4, , 166, 1, 1, , lpr -PP2
DEV P2, 4, , 166, 1, 1, , lpr -PP2
DEV P3, 4, , 166, 1, 1, , lpr -PP3
DEV P4, 4, , 166, 1, 1, , lpr -h -PP4
DEV P5, 4, , 166, 1, 1, , lpr -h -PP5
DEV P6, 4, , 166, 1, 1, , lpr -h -PP6
DEV P7, 4, , 166, 1, 1, , lpr -PP7
DEV P8, 4, , 166, 1, 1, , lpr -PP8
DEV P9, 4, , 166, 1, 1, , cat >fcs
DEV A1, 4, , 166, 1, 1, , lpr -PA1
DEV A3, 4, , 166, 1, 1, , lpr -PA3
DEV Y1, 4, , , 1, 1, , lpr -PY1
DEV Y2, 4, , , 1, 1, , lpr -PY2
DEV H1, 4, , , 1, 1, , lpr -PH1
DEV M1, 4, , , 1, 1, , lpr -PM1
DEV C1, 4, , , 1, 1, , lpr -h -PC1
DEV FX, 4, , , 1, , cat >faxdump
DEV X1, 4, , 166, 1, 1, , cat >dump1
DEV NU, 4, , , , , null
DEV G0, 8
DEV G1, 8
DEV G2, 8
DEV G3, 8
DEV G4, 8
DEV G5, 8
DEV G6, 8
DEV G7, 8
DEV G8, 8
DEV G9, 8
IPL 1, 60, T0, FSLOGO
END
```

Here, we have placed a folder /training in front of the main database directories, thus grouping this database for easy handling

```
[fcs@chameleon training]$ ls
accounts docs export flights ground main
[fcs@chameleon training]$
```

Where the database is used for ongoing training / offline reporting purposes, it is normal to continue to point to the production software directories, although if one was creating a Year End database that we may need to inspect several years after the event, we may choose to include in

that backup stratagem, a copy of the programs which were used to create/report on it. (See End of Year Database Creation)

To affect the backup / synchronisation of our training database above, all that remains is to create the training folder under the root directory together with the sub-ordinate directories and then create a script to populate / maintain this structure.

Here is a sample script for affecting a copy to our training environment:

sync_training script:

```
#!/bin/sh
opts="-av"
rsync $opts --delete --exclude "/docs" /accounts/ /training/accounts
rsync $opts --delete /accounts/docs/ /training/docs
rsync $opts --delete /fares/flights/ /training/flights
rsync $opts --delete /fares/ground/ /training/ground
rsync $opts --delete /main/FILES/ /training/main
rsync $opts --delete /main/export/ /training/export
```

Note the use of --delete to ensure that un-used / deleted files on the recipient are removed upon synchronisation, as well as the suppression of the documents directory copy in the accounts subtree.

Where are script files to be found?

Script files can be placed anywhere, but if you want to issue the command from anywhere, or place an item in the system cron to run the script on a regular basis, then you will normally place the item in one of the default directories. On your servers, any scripts created by FCS are placed in the /usr/local/bin directory:

```
[fcs@chameleon /]$ cd /usr/local/bin
[fcs@chameleon bin]$ ls

clear_basic_logs      dotconf-config      ghost      sync_chameleon      wy60
CNTAPI_V2_Tests.exe  faxmail             stow      sync_training       xmlad

[fcs@chameleon bin]$
```

Do I need to back up anything else?

Chameleon is reliant upon its Business Basic (BB) environment to run, and hence it is always a good idea to ensure that you keep your current license safe, and it may well be worth considering including these files in your backup strategy, although care has to be taken in order not to shut down your BB license in the event of restore/recovery.

FCS loads BB into the /basic folder. The majority of the information held therein is static, and if we examine an example, we can see the breakdown of items held in this folder:

```
[fcs@chameleon basic]$ ls -lt
total 10396
-rw-rw-rw- 1 root root    51461 Dec 11 03:59 cmi.log
-rw-rw-rw- 1 quest quest      0 Dec 10 03:00 ezauth.log
-rw-rw-rw- 1 root root      0 Dec 10 03:00 smi_cache.log
-rw-rw-rw- 1 quest quest      0 Dec 10 03:00 smi_rule.log
drwxrwxrwx 2 root root    28672 Dec 10 02:05 icom
drwxrwxrwx 2 root root    65536 Dec 10 02:00 ati
-rw-rw-rw- 1 fcs fcs      87126 Dec 11 17:20 dump1
-rw-rw-rw- 1 root root   131766 Nov 25 05:51 accounts
-rw-rw-rw- 1 fcs fcs      65631 Nov 17 16:31 fcs
```

```
drwxrwxrwx 2 root root 4096 Nov 17 14:10 IPL
drwxrwxrwx 2 root root 20480 Sep 16 08:49 IDL4
drwxrwxrwx 2 root root 4096 Sep 16 08:47 UTILS
-rw-rw-rw- 1 root root 568 Sep 16 08:42 TERMINAL
-rwxrwxrwx 2 root root 935040 Sep 16 08:41 b
-rwxrwxrwx 2 root root 935040 Sep 16 08:41 basic
-rwxr-xr-x 1 root root 1911 Jul 16 2002 install
-rwxr-xr-x 1 root root 201 Jul 16 2002 install.agh
-rwxr-xr-x 1 root root 2826 Jul 16 2002 install.dir
-rwxr-xr-x 1 root root 3915 Jul 16 2002 install.ghst
-rwxr-xr-x 1 root root 1911 Jul 16 2002 install.menu
-rwxr-xr-x 1 root root 5925 Jul 16 2002 install.prnt
-rwxr-xr-x 1 root root 186 Jul 16 2002 install.term
-rwxr-xr-x 1 root root 2390 Jul 16 2002 install.usr
-r-xr-xr-x 1 root root 10008 Jul 16 2002 tlist
-rw-rw-rw- 1 root root 28077 Jul 16 2002 tlist.c
-rwxrwxrwx 1 root root 189 Jul 16 2002 clearlp
-r-xr-xr-x 1 root root 111392 Jul 16 2002 dcheck
-r-xr-xr-x 1 root root 10456 Jul 16 2002 ghoststat
-rw-rw-rw- 1 root root 224 Jul 16 2002 IPLINPUT
-rw-rw-rw- 1 root root 110 Jul 16 2002 IPLINPUT.term
drwxrwxrwx 2 root root 4096 Jul 16 2002 WORK
-r-xr-xr-x 1 root root 3480 Jul 16 2002 ERROR7
-rw-r--r-- 1 root root 574 Jun 17 2002 qaddress.ini
[fcs@chameleon basic]$
```

The majority of the items will be dated when your current license was loaded onto your system (in the above case, the BB interpreter was refreshed on September 16th), with an original install date of the license of July 16th 2002.

The sub-ordinate directories with the exception of /basic/IPL where FCS stores the customer IPL profiles, are all devoted to Thoroughbred Basis files. This directory may store several profiles relevant to your organization e.g.:

```
[fcs@chameleon IPL]$ ls -lt
total 32
-rw-r--r-- 1 fcs fcs 1104 Nov 17 14:10 training
-rw-r--r-- 1 root root 1116 Oct 3 19:10 quest
-rw-r--r-- 1 fcs fcs 1082 Oct 3 19:07 temp
-rw-r--r-- 1 root root 1123 Aug 6 06:28 fcs
-rw-r--r-- 1 root root 721 Apr 29 2005 york
-rw-r--r-- 1 root root 658 Apr 29 2005 stoke
-rw-r--r-- 1 root root 627 Apr 29 2005 brighton
-rw-r--r-- 1 root root 599 Mar 8 2005 opodo
[fcs@chameleon IPL]$
```

The only other areas where Thoroughbred Configuration Files are stored is for the license token :

```
[fcs@chameleon IPL]$ cd /usr/lib/basic
[fcs@chameleon basic]$ ls -lat
total 48
-rw-rw-rw- 1 root root 5135 Sep 16 21:44 tbredbas.85
drwxrwxrwx 2 root root 4096 Sep 16 08:41 .
drwxr-xr-x 48 root root 32768 Sep 16 08:40 ..
[fcs@chameleon basic]$
```

In addition to this, it is necessary to attach / link terminal profiles to BB sessions, and this information is stored in the following location “

```
[fcs@chameleon basic]$ cd /basic/UTILS
[fcs@chameleon UTILS]$ ls -lt
total 492
-rw-r--r-- 1 root root 275456 Sep 16 08:42 TCONFIG8
-rw-r--r-- 1 root root 213504 Sep 16 08:42 TCONFIGW
[fcs@chameleon UTILS]$
```

Because of the sensitivity of BB to corruption of its license on recovery, we tend to ensure that a digital copy of your license revision is held on disk for handy online restore / activation so that the distribution media itself can stay safely tucked away in the firesafe unless it is required.

Sample Production System Synchronization Script

Typically you are likely to be synchronizing your data across onto a separate server where it may be additionally backed up to tape or populated across periodically into local training databases or other test case databases. It is usual to mirror the database structure between the production image and the backup/recovery image under these circumstances, especially if the backup server is capable of supporting production load in the event that your main server fails. Chameleon security and licensing is controlled through the main routing module FSLOGO and this file should not be copied across systems as it is synchronized with the Business Basic security and will deny total access to all Chameleon online in the event of compromise.

Some clients do hold full basic licenses or their recovery servers, but in the main this is a "temporary installation" which supports three users in non-activation mode which is sufficient to ensure integrity of backup data on an ongoing basis. In the event of a switchover being required, Your production system license will be transferred to your backup server and be activated there. This requires interaction with Thoroughbred USA and would not normally be undertaken except on a needs must basis.

There follows an example synchronization script for production to backup server:

```
[root@backup bin]# more sync_chameleon
#!/bin/sh

opts="-avz"

rsync $opts chameleon: : root/etc/sysconfig/static-routes /etc/sysconfig
rsync $opts chameleon: : root/etc/hosts /etc
rsync $opts chameleon: : root/etc/faxmail.cfg /etc
rsync $opts chameleon: : root/etc/cups/printers.conf /etc/cups
rsync $opts chameleon: : root/etc/samba/smb.conf /etc/samba

rsync $opts --delete chameleon: : root/basic/IPL/ /basic/IPL
rsync $opts --delete --exclude "FSLOGO" chameleon: : root/chameleon/ /chameleon
rsync $opts --delete chameleon: : root/accounts/ /accounts
rsync $opts --delete chameleon: : root/fares/ /fares
rsync $opts --delete chameleon: : root/main/ /main
[root@backup bin]#
```

Note the exclusion of the program "FSLOGO" when copying across the software tree /chameleon. This technique can be used to suppress the synchronization of old archive FFARD"xx" files as well as any others as appropriate

Test Case Scenario

How can I set up a backup database on another server to reflect either my production environment (e.g. to create a copy of an End of Year Database) or a training environment?

Drawing up a procedure

There are several basic steps which must be adhered to:

1. Check that you have enough space on the recipient server
2. Create the folder / database structure required to support your new environment

3. Create a script to copy across / synchronize from the 'donor' environment to the 'recipient' environment and do a trial run
4. Set up a new IPL to map to the recipient database and check availability of printers from that environment
5. Set up sign-in from o/s prompt to access the new environment

Checking for Space

It is imperative that you first check that the server where you intend to create a copy environment has sufficient space to support it without jeopardizing the daily backup requirements. You need to do this from the Operating System itself, but logging in as the operator (root access) and issuing the command `df -v`

```
[root@backup bin]# df -v
Filesystem            1K-blocks      Used Available Use% Mounted on
/dev/mapper/VolGroup00-LogVol00
138658832 25396376 106218976 20% /
/dev/sda1
101086 19999 75868 21% /boot
none
1037360 0 1037360 0% /dev/shm
```

Typically if the system shows that you have at less than 50% used, then you should be safe to proceed with the work. Care should be taken however, to issue the same command on the live sever, and check whether the total blocks on the backup server, showing as (138658832) in the above example , is at least as large as the production server, so that you are comparing like with like.

If in doubt, contact your Chameleon Support team who will be happy to advise you.

Setting Up the Database Environment

In this exercise, we are going to set up a Training Database on our backup server to mirror the data on the live server, but gives us an environment that can be readily ported making it suitable as a model for End of Year use as well.

With reference to the extract from the training IPL above:

```
DEV D3, 1, , , , , /training/accounts
DEV D4, 1, , , , , /training/ground
DEV D5, 1, , , , , /training/flights
DEV D6, 1, , , , , /training/main
DEV D7, 1, , , , , /chameleon/PROGS
DEV D8, 1, , , , , /chameleon/FCS UTILS
DEV D9, 1, , , , , /training/docs
DEV DA, 1, , , , , /pnr
DEV DB, 1, , , , , /training/export
DEV DC, 1, , , , , /chameleon/EDI
```

On the production server we have our database sub-ordinate to the /training folders, and the software pointing at the live production modules. We can either choose to replicate this on the backup server, by pointing to the software held against the production system backup area, or replicate the software within our training environment/End of Year environment, thus ensuring that the software is pertinent to the database release in our archive database at any time in the future when we wish to revisit this database.

Building our directory structures

There follows a list of commands that can be entered into the system to build the database folder structures to support the new environment. Where it is envisaged that several databases may be need to be created, then these could be incorporated into a script if desired:

```
[root@backup bin]# cd /
[root@backup /]# mkdir training
[root@backup /]# chmod 777 training
[root@backup /]# cd training
[root@backup training]# ls
[root@backup training]# mkdir files
[root@backup training]# mkdir chameleon
[root@backup training]# chmod 777 *
[root@backup training]# cd files
[root@backup files]# mkdir accounts
[root@backup files]# mkdir ground
[root@backup files]# mkdir flights
[root@backup files]# mkdir main
[root@backup files]# mkdir docs
[root@backup files]# mkdir export
[root@backup files]# chmod 777 *
[root@backup files]# cd ../chameleon
[root@backup chameleon]# mkdir PROGS
[root@backup chameleon]# mkdir FCS_UTILS
[root@backup chameleon]# mkdir EDI
[root@backup chameleon]# chmod 777 *
[root@backup chameleon]#
```

We take the above steps:

1. Create the environment folder (/training)
2. Add the database and software folders next to ensure integrity between database and data (/training/files and /training/chameleon)
3. Go into the files directory (/training/files) and add in the mirror folders from the production environment (/training/files/accounts, /training/files/ground, /training/files/flights, /training/files/main, /training/files/docs and /training/files/export). Note it is important to open up the permissions on these directories as they are created so that the business basic shell will have full access rights to these folders. (chmod 777 *)
4. Go into the software folder (/training/chameleon) and add the mirror software folders from the production environment (/training/chameleon/PROGS, /training/chameleon/FCS_UTILS, /training/chameleon/EDI) ensuring once again that the permissions are opened up on these folders as they are created (chmod 777 *)

We then take our production backup script and adjust it to copy the training environment on the production server (/chameleon/training/) into the new training environment on the backup server (/backup/training)

```
#!/bin/sh
opts="-avz"

rsync $opts chameleon: : root/etc/sysconfig/static-routes /etc/sysconfig
rsync $opts chameleon: : root/etc/hosts /etc
rsync $opts chameleon: : root/etc/faxmail.cfg /etc
rsync $opts chameleon: : root/etc/cups/printers.conf /etc/cups
rsync $opts chameleon: : root/etc/samba/smb.conf /etc/samba

rsync $opts --delete chameleon: : root/basic/IPL/ /basic/IPL
rsync $opts --delete --exclude "FSL0G0" chameleon: : root/chameleon/ /training/chameleon
rsync $opts --delete chameleon: : root/training/ /training/files
```

For completeness, we can choose to leave in / incorporate synchronization of the printer definitions and the host-to-host environments, though these will normally be done every night during the daily backup

```
rsync $opts chameleon: : root/etc/sysconfig/static-routes /etc/sysconfig
rsync $opts chameleon: : root/etc/hosts /etc
rsync $opts chameleon: : root/etc/faxmail.cfg /etc
rsync $opts chameleon: : root/etc/cups/printers.conf /etc/cups
rsync $opts chameleon: : root/etc/samba/smb.conf /etc/samba
```

Clearly it is imperative that you OMIT THESE if the environment is being created on the production server itself!

```
rsync $opts --delete --exclude "FSL0G0" chameleon: : root/chameleon/ /training/chameleon
rsync $opts --delete chameleon: : root/training/ /training/files
```

Having simplified the structure, we merely need to copy the training files home directory (chameleon:/training) and the software home directory structure (chameleon:/chameleon) to their new respective home directories backup: /training/files and backup: /training/chameleon.

We ideally need to create a separate IPL for the training sessions on the backup server to those on the live (if this is what we are trying to achieve) unless the directory structures are the same. If they are the same, then we can add the IPL database mirror to our synchronization script

```
rsync $opts --delete chameleon: : root/basic/IPL/ /basic/IPL
```

Adding Access to the New Environment

All that remains now is to create a new IPL on the backup server which points to our new environment and then create a sign-in profile that executes basic picking up this new IPL file.

Creating a new IPL

With the editor of your choice, you can pick up the /basic/IPL/training file which will already be mirrored onto the backup server, and amend/copy it into a new IPL :

Sample backup_training IPL

```
CNF 1, 44, 1, 120, , , , D
PTN 1, 600000
PRM LONGVAR
PRM IF47
DEV D0, 1, , , , , UTILS
DEV D1, 1, , , , , IDL4
DEV D3, 1, , , , , /training/files/accounts
DEV D4, 1, , , , , /training/files/ground
DEV D5, 1, , , , , /training/files/flights
DEV D6, 1, , , , , /training/files/main
DEV D7, 1, , , , , /training/chameleon/PROGS
DEV D8, 1, , , , , /training/chameleon/FCS_UTILIS
DEV D9, 1, , , , , /training/files/docs
DEV DA, 1, , , , , /pnr
DEV DB, 1, , , , , /training/files/export
DEV DC, 1, , , , , /training/chameleon/EDI
PFM LISTPAREN
DEV T0, 5, , , , , tty
DEV TL, 7, , , , , tty1a15
DEV TM, 7, , , , , tty1a16
DEV P1, 4, , 166, 1, 1, , lpr -PP1
DEV P2, 4, , 166, 1, 1, , lpr -PP2
```

```
DEV P2, 4, , 166, 1, 1, , lpr -PP2
DEV P3, 4, , 166, 1, 1, , lpr -PP3
DEV P4, 4, , 166, 1, 1, , lpr -h -PP4
DEV P5, 4, , 166, 1, 1, , lpr -h -PP5
DEV P6, 4, , 166, 1, 1, , lpr -h -PP6
DEV P7, 4, , 166, 1, 1, , lpr -PP7
DEV P8, 4, , 166, 1, 1, , lpr -PP8
DEV P9, 4, , 166, 1, 1, , cat >fcs
DEV A1, 4, , 166, 1, 1, , lpr -PA1
DEV A3, 4, , 166, 1, 1, , lpr -PA3
DEV Y1, 4, , , 1, 1, , lpr -PY1
DEV Y2, 4, , , 1, 1, , lpr -PY2
DEV H1, 4, , , 1, 1, , lpr -PH1
DEV M1, 4, , , 1, 1, , lpr -PM1
DEV C1, 4, , , 1, 1, , lpr -h -PC1
DEV FX, 4, , , 1, , , cat >faxdump
DEV X1, 4, , 166, 1, 1, , cat >dump1
DEV NU, 4, , , , , nul l
DEV G0, 8
DEV G1, 8
DEV G2, 8
DEV G3, 8
DEV G4, 8
DEV G5, 8
DEV G6, 8
DEV G7, 8
DEV G8, 8
DEV G9, 8
IPL 1, 60, T0
```

Note: You are unlikely to provide a “new” folder for PNR’s and it is rare that you have the ability to feed pnr’s in parallel into the backup/training file. However, it is possible to stop the pnr polling ghost for a while and build up a sizeable folder full of sample pnr’s, and to copy these to a save directory for re-use in training. It should be noted that as PNR’s do “date”, so such an operation tends to be done on an as-need basis when you are conducting specific training in this area.

Setting up a login profile

Unless you are a seasoned system administrator, it would be best to ask your Chameleon Support team to set this up for you. Once a user is added into the operating system with the appropriate password and securities, its login script can be modified to access the desired environment:

```
# . bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi

# User specific environment and startup programs

PATH=$PATH:$HOME/bin

export PATH
unset USERNAME
cd /basic
exec ./bin/IPL/backup_training
exit
```

Feedback

We hope that you have found this manual informative and would very much like to receive your feedback / suggestions for improvements, inclusions or exclusions. These should be sent to suggestions@franek.co.uk or contact a member of our Support Team directly.