

FileXfer

File Transfer Jobs

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Abstract

The FileXfer application is a system for automated file transfer jobs for copying files. “There are 3 applications that make up the usage collection framework: `filexfer`, which does the actual file transfers; `filexfer-jobmonitor`, which is configured to monitor various aspects of jobs and create NMS alarms when necessary; and `filexfer-dataloader`, which bulk-loads file data into database tables. There are also house-keeping scripts called `filexfer-filearchive`, which keeps files in the data directory pruned and compressed, and `filexfer-fileunarchive`, which allows files to be pulled out of the archive so `filexfer` jobs can work with them again.”¹

¹[Usage Collection Framework \(filexfer\)](#)

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List of Definitions and Abbreviations

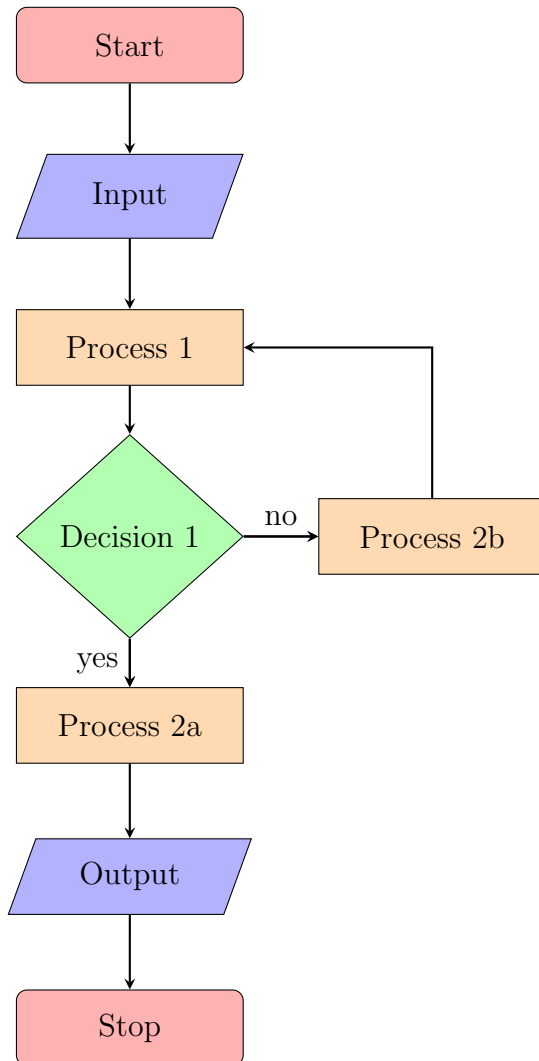
- **MOA** - Municipality of Anchorage

1 Introduction

The FileXfer system...

2 Design

[FIXME: Need data here...]



[FIXME: Customize flowchart FileXfer]

3 Implementation

[FIXME: Need data here...]

3.1 Logging

Application Logging

The filexfer applications log to the `/var/log/filexfer` directory on `prod-prov4-cdr1.\operations.gci.com`. The parent filexfer jobs log to `filexfer-get.log` and `filexfer-put.log`. The jobmonitor and dataloader applications log to `jobmonitor.log` and `dataloader.log`. The filexfer applications log to the `/var/log/filexfer` directory on `prod-prov4-cdr1.operations.gci.com`. The parent filexfer jobs log to `filexfer-get.\log` and `filexfer-put.log`. The jobmonitor and dataloader applications log to `jobmonitor.log` and `dataloader.log`, respectively. Each file transfer job is executed as a child process and gets its own log file. The format is `filexfer-{neName}-{idJob}-{get,put}.log`.

By default, the jobs log at the warn level. Adjust the level to info to get a high-level view of the application's state. Adjust log verbosity by modifying the appropriate config file in `/etc/filexfer`. The changes will take effect after the next program execution.

Errors are also logged to a database table which can be browsed in the filexfer web interface under the 'Logs & Errors' view. This view includes messages logged at `warn`, `error`, and `fatal` severity.²

File Transfer Logging

Every file transfer is recorded in a database table. There are two reasons for this table: first, it tells `filexfer` which files have already been transferred, and second, it provides an audit trail for SOX compliance. The table is `filexfer.logs` on `sadc-cdr-mysql1.operations.gci.com`. Use the `filexfer.joblogs` view to easily find logs by job name or network element ID.

File transfer logs may also be viewed in the 'Logs & Errors' page of the web interface.³

²Usage Collection Framework (filexfer)

³Usage Collection Framework (filexfer)

4 Test

[FIXME: Need data here...]

5 Issues

[FIXME: Need data here...]

6 Operation

[FIXME: Need data here...]

6.1 Job Scheduling

Jobs are scheduled using a web interface at `nms.operations.gci.com/relevance`. Navigate to the “FileXfer” application and click the “File Transfer Jobs” link. Job execution happens on `prod-prov4-cdr1.operations.gci.com`. A `cron` job executes every minute from `/etc/cron.d/filexfer` to kick off the various `filexfer` scripts.⁴

Job Timing

The parent `filexfer` script is responsible for spawning child processes for each job. Since a large number of jobs can be scheduled at any given interval, the parent process limits how many children can run concurrently. As long as the limit is reached and more jobs need to be spawned, the parent process must stay alive. Since this may take longer than 1 minute, it is possible for `filexfer` to miss certain scheduling intervals.

For example, if 500 jobs are scheduled to run at the top of every hour (`0 * * * *`) and the maximum child process limit is 50, there is a good chance `filexfer` will not execute any jobs scheduled to run at 1 minute past the hour (`1 * * * *`). The best way to avoid this is to use 0, 15, 30, or 45 in the minute field of the job schedule. These intervals are always executed.⁵

6.2 Dataloader

Dataloader jobs are configured using the web interface at `nms.operations.gci.com/relevance`. Navigate to the “FileXfer” application and click the “Data Load Jobs” link. These jobs are executed every minute as long as there are files in the load queue.⁶

⁴[Usage Collection Framework \(filexfer\)](#)

⁵[Job Timing](#)

⁶[Usage Collection Framework \(filexfer\)](#)

7 Examples

Series of useful \LaTeX markup. Need to break out to separate examples.tex file.

7.1 Escaping $<$ and $>$ Symbols

To get $\$<\$$ or $\$>\$$ just wrap the symbols in $\$$ for math mode.

7.2 Enumerate

1. DNR - Alaska State Department of Natural Resources
 - HI - Historical Index, not maintained since 1982
 - LE - Land Estate, maintained by SGU
 - ME - Mineral Estate, maintaind by SGU
2. Alaska State Surveys
 - ASBLT - As-Built Survey
 - ASCS - Cadastral Survey

7.3 Comments

COMMENTS Comment — *Sean Weems, Spring 2003*

We should get the **COMMENTS** column searchable via the landrecords application before we do much anything else – shouldn't be too hard.

Errata: Plats spanning multiple sections

A few anomalies can be observed in the **AKPLATS** table. Specifically plats exist that span multiple sections. Since the table only has a single column, **SCODE**, that accepts a single section code, SGU (Status Graphics Unit) has handled this problem by entering multiple rows in the table, each with a different section that point to the same plat or file. Multiple section plats are indicated by setting the **TCODE** column to the value 37, and making an appropriate notation like *Section 24-25-26-27* in the **REMARKS** column.

[FIXME: Perhaps the **SCODE** column should accept an array of sections?]

7.4 Footnotes

See my footnote⁷ generated with:

```
\footnote{\href{http://www.google.com/search?q=latex+footnotes}
{Search google for footnotes.}}
```

GoogleGuide — Linking to Search Results.⁸

7.5 Hyperlinks

Use `\href{}` to generate hyperlinks:

```
\href{http://www.google.com}{Google}}
```

Yields: [Google](http://www.google.com)

7.6 Table Examples

Column Name	Type	Description
EQS	VARCHAR2(1)	!NULL map shows village selections
ITM_COL	VARCHAR2(1)	USGS ITM column: 1-6
ITM_ROW	VARCHAR2(1)	USGS ITM row: A-E
QMQ_ABBR_DNR	VARCHAR2(3)	Three character DNR abbreviation for the QMQ
RASTER_FILENAME	VARCHAR2(50)	Physical path to file
RASTER_PATHNAME	VARCHAR2(50)	URL path to PDF of map
SCODE	VARCHAR2(2)	Supplement map code: 1,2,3,...
COMMENTS	VARCHAR2(256)	Plat comments

Table 1: EASEMENTS_17B Table

⁷[Search](#) google for footnotes.

⁸GoogleGuide — [Linking to Search Results](#).

XML element	Description
FNUM	US Survey file number
MERIDIAN	BLM meridian code 12 = Copper River 13 = Fairbanks 28 = Seward 44 = Kateel 45 = Umiat
TOWNSHIP	Five character Township code
RANGE	Five character Range code
PAGE	Survey page number 1,2,3,...
FILENAME	Relative path to file in direcorey

Table 2: USS XML index elements

col 1	col 2	col 3	col 4
item 1	item 2	item 3	item 4
item 1	item 2	item 3	item 4

Table 3: Demo

Virtual Machine	Apache	ELM	LM	Elluminate Server
dcs-elive-prod01		x	x	x
uaa-elive-dev01	x	x	x	
uaa-elive-server01				x
uaa-elive-prod01		x	x	x
uaf-elive-prod01		x	x	x
uas-elive-prod01		x	x	x

Table 4: Daemons

Column Name	Type	Description
MTR	VARCHAR2(9)	Meridian, Township, Range, example: <i>C026S054E</i>
QMQ	VARCHAR2(3)	Quarter Million Quadrangle code, example: <i>DIL</i> (Dillingham quadrangle)

Table 5: XREF_MTR.QMQ Table

7.7 Verbatim

“The verbatim environment is a paragraph-making environment that gets L^AT_EX to print exactly what you type in. It turns L^AT_EX into a typewriter with carriage returns and blanks having the same effect that they would on a typewriter.”⁹

```
\begin{verbatim}
  text
\end{verbatim}
```

Figure formatting with verbatim

The following figure leverages verbatim for proper formatting:

```
gis/raster/
  dnr/
    map_library/
      plats/
        SP/YYYYMMDD/*.pdf          # indexed
        HI/YYYYMMDD/*.pdf          # Indexed
        ASLS/YYYYMMDD/*.pdf        # Indexed
      recorded-plats/
        YYYYMMDD/*.pdf
  blm/
    easements_17b/YYYYMMDD/*.pdf  # indexed
    mtp/YYYYMMDD/*.pdf             # non-indexed
    usrs/YYYYMMDD/*.pdf            # indexed
    usrs-notes/YYYYMMDD/*.pdf      # indexed
    uss/YYYYMMDD/*.pdf             # indexed
    uss-notes/YYYYMMDD/*.pdf       # indexed
    usms/YYYYMMDD/*.pdf            # indexed
    usms-notes/YYYYMMDD/*.pdf      # indexed
  usgs/
    drg/
      collared/
        250K/
        63K/
        25K/
        24/
      decollared/
      tools/
      missing\_data/
  dem/
  doq/
  topo/
```

Figure 1: File and Directory Structure

Appendix

Source

There are 3 primary FileXfer perl scripts on prod-prov4-cdr1:¹⁰

File name	Attributes	Description
filexfer.plx	181 lines	File transfer jobs
filexfer-dataloader.plx	132 lines	Data loader
filexfer-jobmonitor.plx	132 lines	Job Monitor

Table 6: FileXfer perl scripts on prod-prov4-cdr1

¹⁰prod-prov4-cdr1.operations.gci.com (192.168.161.47, NATed IP: 66.223.199.228), data including CDRs and such under /data/usage/ — Network Services, OSS.

filexfer.plx — File Transfer Jobs

```
#!/usr/bin/perl
```

```
use strict;
use warnings;
```

```
use Modules::App::FileXfer ();
our $VERSION = $Modules::App::FileXfer::VERSION;
```

```
# Core modules
use Clone qw( clone );
use File::Basename ();
use File::Spec ();
use POSIX ();
```

```
$SIG{CHLD} = \&Modules::App::FileXfer::REAPER;
```

```
MAIN: {
    # Process and merge command-line and config file options
    my $getopt = Modules::App::FileXfer::get_command_line_options();
    my $fileconf = Modules::App::FileXfer::read_config_file( $getopt->get_configfile );
    Modules::App::FileXfer::merge_options( $getopt, $fileconf );

    # Make sure we're the only instance running
    Modules::App::FileXfer::check_pid_file( $Modules::App::FileXfer::Options->{pidfile} );

    # Get logger and evenge objects
    Modules::App::FileXfer::create_evenge_obj();
    my $logger = Modules::App::FileXfer::create_logger_obj(
        $Modules::App::FileXfer::Options->{logger}, $Modules::App::FileXfer::Program );

    # Get the ready jobs
    my $fx = Modules::App::FileXfer::create_filexfer_obj( $Modules::App::FileXfer::
    my $jobs = Modules::App::FileXfer::get_jobs( $fx );
    my $loadjobs = Modules::App::FileXfer::get_jobs_with_load_jobs( $fx );
    undef $fx;

    for my $job ( @{ $jobs } )
    {
        # Enforce the "max children" constraint
        $logger->info( 'Max child processes reached. Waiting for one to complete before
            if ( scalar keys %Modules::App::FileXfer::Children
                >= $Modules::App::FileXfer::Options->{maxchildren} );
```



```

sleep 1 while ( scalar keys %Modules::App::FileXfer::Children
                >= $Modules::App::FileXfer::Options->{maxchildren} );

# Fork a child process for this job
$logger->info( sprintf( 'Spawning child process for job "%s".', $job->jobName ) )

my $pid = fork;
defined $pid or Modules::App::FileXfer::log_event(
    5, sprintf( "Can't fork for job \"%s\": %s", $job->jobName, $! ), 'logdie' )

if ( $pid == 0 ) # child
{
    # Set random seed for this child
    srand();

    # Lower the OS scheduling priority based on job priority
    POSIX::nice( Modules::App::FileXfer::pri_to_nice( $job->priority ) );

    # Add the NE name to our command line string
    $0 .= " @ARGV " . $job->neName;
    my $jobtag = Modules::App::FileXfer::get_jobtag( $job );

    # Set the subresource for this job in the evenge object
    $Modules::App::FileXfer::Evenge->subresourceName( $job->jobName );

    # Create a logger specific to this child process
    my $logopt = clone( $Modules::App::FileXfer::Options->{logger} );
    my ( undef, $logdir ) = File::Basename::fileparse( $logopt->{file}{filename} );
    $logopt->{file}{filename} = File::Spec->catfile( $logdir, "$jobtag.log" );

    $logger->delete();
    my $logger = Modules::App::FileXfer::create_logger_obj( $logopt, $job->jobName );
    Log::Log4perl::MDC->put( 'idJob', $job->idJob );

    # Make sure another instance isn't still running
    Modules::App::FileXfer::check_pid_file( $jobtag );

    # Create a FileXfer object for database updates
    my $fx = Modules::App::FileXfer::create_filexfer_obj( $jobtag );

    # Execute the job
    Modules::App::FileXfer::run_job( $fx, $job, $loadjobs );

```

```
        $logger->info( 'Child exiting.' );
        exit 0;
    }
    else # parent
    {
        $logger->debug( sprintf( 'Spawned child process %d for job "%s".', $pid, $job->jobName );
        $Modules::App::FileXfer::Children{ $pid } = $job->jobName;
    }
}

$logger->info( 'Main application exiting.' );
}

# Safely exit
$SIG{CHLD} = 'IGNORE';

__END__

=head1 NAME

filexfer -- Move a file from point A to point B over an IP network

=head1 VERSION

0.51

=head1 SYNOPSIS

filexfer.plx -c configfile -t {get|put} [options]

=head1 ARGUMENTS

=over 4

=item -c, --configfile

Specify the configuration file to load. Must be in YAML format.

=item -t, --transfertype

One of "get" or "put". Get jobs download files and put jobs upload files.

=back
```

=head1 OPTIONS

=over 4

=item -d, --piddir

Directory where the pid file will be written. Defaults to /var/run/filexfer.

=item --db

Sets the database connection parameters. Valid keys are: server (default localhost), port (default 3306), driver (default mysql), uid, pwd, database, and table. Specify tags as key/value pairs, e.g.:

 --db server=localhost --db database=filexfer

=item -e, --evengehost

Address of the Evenge web server. Used to send indicators and events to the NMS system.

=item --evengetimeout

Timeout in seconds for communicating with the Evenge web server. Defaults to 10.

=item -f, --cachefile

Template cache file location. Defaults to /var/lib/filexfer/filexfer.kch.

=item -h, --help

Output this documentation.

=item -m, --maxchildren

Maximum number of child processes to spawn. Defaults to 50.

=item -p, --pidfile

PID file name. This will be appended with a ".pid" suffix.

=item -r, --resource

Resource name of this application. Used in indicator and event messages sent to the NMS

=item --verbose, -v

Log to the screen at increasingly verbose levels. This option may be repeated multiple times to increase the log level. For example, "-v" logs at info level, "-vv" logs at debug level, and "-vvv" logs at trace level.

=back

filexfer-jobmonitor.plx — Job monitor

```
#!/usr/bin/perl
```

```
use strict;
```

```
use warnings;
```

```
use Modules::App::FileXfer::JobMonitor ();
```

```
our $VERSION = $Modules::App::FileXfer::JobMonitor::VERSION;
```

```
MAIN: {
```

```
    # Process and merge command-line and config file options
```

```
    my $getopt = Modules::App::FileXfer::JobMonitor::get_command_line_options();
```

```
    my $fileconf = Modules::App::FileXfer::JobMonitor::read_config_file( $getopt->get_co
```

```
    Modules::App::FileXfer::JobMonitor::merge_options( $getopt, $fileconf );
```

```
    # Make sure we're the only instance running
```

```
    Modules::App::FileXfer::JobMonitor::check_pid_file(
```

```
        $Modules::App::FileXfer::JobMonitor::Options->{pidfile} );
```

```
    # Get logger and evenge objects
```

```
    Modules::App::FileXfer::JobMonitor::create_evenge_obj();
```

```
    my $log = Modules::App::FileXfer::JobMonitor::create_logger_obj(
```

```
        $Modules::App::FileXfer::JobMonitor::Options->{logger},
```

```
        $Modules::App::FileXfer::JobMonitor::Program
```

```
    );
```

```
    # Get a list of job monitors
```

```
    my $jm = Modules::App::FileXfer::JobMonitor::create_jobmonitor_obj();
```

```
    my $mons = Modules::App::FileXfer::JobMonitor::get_monitors( $jm );
```

```
    for my $mon ( @{ $mons } )
```

```
    {
```

```
        Log::Log4perl::MDC->put( 'idJob', $mon->idJob );
```

```
        $log->info( sprintf( 'Executing monitor "%s".', $mon->monitorName ));
```

```
        # Set the subresource for this monitor in the evenge object
```

```
        $Modules::App::FileXfer::JobMonitor::Evenge->subresourceName( $mon->monitorName
```

```
        # Execute the job monitor
```

```
        eval { Modules::App::FileXfer::JobMonitor::run_monitor( $jm, $mon ) };
```

```
        $@ and $log->error( "$@" );
```

```
    }
```

```
$log->info( 'Main application exiting.' );
}

__END__

=head1 NAME

jobmonitor -- Monitor filexfer jobs for any condition and generate alerts

=head1 VERSION

0.51

=head1 SYNOPSIS

jobmonitor.plx -c configfile [options]

=head1 ARGUMENTS

=over 4

=item -c, --configfile

Specify the configuration file to load. Must be in YAML format.

=back

=head1 OPTIONS

=over 4

=item -a, --mailhost

Address of the mail server. Used to send email notifications. Defaults to localhost.

=item -d, --piddir

Directory where the pid file will be written. Defaults to /var/run/filexfer.

=item --db

Sets the database connection parameters. Valid keys are: server (default
localhost), port (default 3306), driver (default mysql), uid, pwd, database,
and table. Specify tags as key/value pairs, e.g.:
```

--db server=localhost --db database=filexfer

=item -e, --evengehost

Address of the Evenge web server. Used to send indicators and events to the NMS system.

=item -f, --cachefile

Template cache file location. Defaults to /var/lib/filexfer/jobmonitor.kch.

=item -h, --help

Output this documentation.

=item -i, --mailinterval

Minimum time, in seconds, before repeat emails may be sent for the same monitor. Default

=item -l, --mailfrom

Sender's email address in email notifications. Defaults to [username]@[hostname].

=item -m, --mailstatfile

Mail status file location. Defaults to /var/lib/filexfer/jobmonitor-mailstat.kch.

=item -o, --mailport

Port on which the mail server is listening for SMTP traffic. Defaults to 25.

=item -p, --pidfile

PID file name. This will be appended with a ".pid" suffix.

=item -r, --resource

Resource name of this application. Used in indicator and event messages sent to the NMS

=item --verbose, -v

Log to the screen at increasingly verbose levels. This option may be repeated multiple times to increase the log level. For example, "-v" logs at info level, "-vv" logs at debug level, and "-vvv" logs at trace level.

=back

[FIXME: Need data here]

Table 7 – FileXfer directories and files on prod-prov4-cdr1

Directory	File(s)
/etc/filexfer/	*.conf
/usr/bin/	filexfer-dataloader filexfer-dataloader.plx filexfer-dataloader.plx.mbak filexfer-epg-dataloader.plx filexfer-filearchive filexfer-filearchive.sh filexfer-fileunarchive filexfer-fileunarchive.sh filexfer-jobmonitor filexfer-jobmonitor.plx filexfer.plx
/usr/lib/filexfer/	*.gz, *.sh, *.plx ExtractCarrierTurboZoneUsage*
/usr/share/filexfer/	filexfer.changelog-*.xml filexfer.changelog-master.xml liquibase.sh .gnupg/pubring.gpg .gnupg/random_seed
/var/cache/yum/build/packages/	filexfer-0.52-1.el5.centos.noarch.rpm
/var/lib/filexfer/	dataloader.kch dataloader_temp.kch filexfer-aaa01-13-get.kch ... filexfer-wps01-706-get.kch filexfer.kch jobmonitor-mailstat.kch jobmonitor.kch
/var/log/filexfer	*.log ExtractCarrierTurboZoneUsage_ACS.log archive convert-wps-om-counters-report-part2.log convert-wps-om-counters-report.log dataloader.log dataloader_temp.log
Continued on next page	

Table 7 – continued from previous page

Directory	File(s)
	dataloadinsert.log
	datarecovery.log
	epg-dataloader.log
	ericsson-oss-rl-reports-preprocess.log
	ericsson-oss-sts-reports-preprocess.log
	filearchive.log
	filexfer-aaa01-13-get.log
	filexfer-aaa01-14-put.log
	...
	/var/log/filexfer/filexfer-wps01-706-get.log

Links

A Guide to L^AT_EX

<http://www.astro.rug.nl/~kuijken/latex.html>

L^AT_EX - From Wikibooks, the open-content textbooks collection

<http://en.wikibooks.org/wiki/LaTeX>

L^AT_EX Notes

http://luke.breuer.com/time/item/LaTeX_Notes/180.aspx