



# Pacific Knowledge Systems

RippleDown Log File Management

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## Intended Use

The RippleDown Software is a decision support system intended to support staff of healthcare organisations in the auditing and/or interpretation of patient data and in the generation of patient reports and/or workflow actions. The criteria it applies is determined by subject matter experts employed by individual clients and is specific to each client site. The software does not contain any pre-programmed clinical information or any inherent diagnostic functionality.

The RippleDown Expert module is intended to be used purely as a decision support system that provides complementary reports for patient data to qualified individuals based upon established rules set up by relevant trained customer domain experts. It is intended that the clinicians receiving reports based on patient results will consider the report in conjunction with all current and previous patient history, and apply their own judgement when determining patient management. It is intended that the clinician does not rely solely on the existence of a report from RippleDown for the management of a patient.



It is the responsibility of the licensee to use the product in accordance with its intended use. In support of this, it is recommended domain experts include a statement consistent with the following on all reports and include the basis for any recommendation made.

“This report has been generated using clinical decision support software. This report is intended to provide adjunctive information only and should not replace clinical judgement.

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## Intended for

Client IT staff who have the responsibility of supporting RippleDown at their site.

## Scope of Guide

This document explains the contents of the log files generated by the RippleDown server so that support engineers can:

1. Check RippleDown logs and look for errors.
2. Identify issues that can be solved internally and those that need to be referred to PKS.
3. Track the processing of particular cases through the system.
4. Use data mining tools to gather usage and performance statistics.

In addition, this document describes the events that will automatically generate an email to a nominated address of a support engineer for immediate attention.

## RippleDown log files

### Overview









The RippleDown server logs are text files in a dedicated directory under the RippleDown installation directory.

<installation folder>/logs

Each log file is limited to 10MB in size, after which a new file is created. A new file is also created during daily housekeeping (usually at 2am local time).

The current (i.e. still being written to) log file is called "rd.log". The previous log file has a .0 appended so will be rd.0, the one before that rd.1. Up to 100 log files are saved with the oldest one being rd.99. Here is an example log directory with one current and seven rolled logs:

#### Name

-  rd
-  rd.6
-  rd.5
-  rd.4
-  rd.3
-  rd.2
-  rd.1
-  rd.0

## What is logged

The entries in the log files can be classified as follows:

- Case processing entries. These record when cases are received from the clinical data source, their interpretation, validation and the sending of an interpretation.
- User activity entries. Almost all user activity is reflected in log file entries that include the user involved and details of the user action, such as approving a case in the Validator or editing a comment.
- Internal server activities such as housekeeping.

## Format of log entries

Most log entries consist of a single line as follows:

- A date and time (to millisecond precision),
- A code indicating the severity of the log entry, for example "INFO" for routine activity, "WARN" for a possible problem.
- Activity-specific information. Often this is given as a list of key=value pairs, separated by commas.

## Significant log entries

### Server lifecycle entries

The following log entries record significant events in the starting, stopping and automatic maintenance of the RippleDown server.

Entry	Meaning
2016-10-11 10:39:05:321 INFO ***** <b>Starting server</b> , Version: 7.5.0-b8 built on 3 October , db: Infinity *****	The server has been started but is not yet available for processing until all databases have been opened.  This also identifies the version of RippleDown installed on this server.
2016-10-11 10:39:15:957 INFO <b>exported</b>	The server is now ready
2016-11-08 01:00:16:427 INFO <b>House keeping started</b> . Version: 7.4.5-b69 built on 21 september 2016	Housekeeping has been started, the server will be offline until it completes
2016-11-08 01:05:32:697 INFO <b>Support email sent: 724</b>	One of the first entries of a log file after a successful housekeeping
2016-10-11 13:19:27:842 INFO <b>About to switchoff</b> .	The server has been stopped by shutting down the server from the Administrator client.

## Recommended minimum monitoring

PKS recommends the following log entries are monitored at a minimum:

Event	Entry	Meaning
House-keeping duration < 20 mins: the time between these two log file entries	2016-11-08 01:00:16:427 INFO <b>House keeping started.</b> Version: 7.4.5-b69 built on 21 september 2016	Housekeeping has been started, the server will be offline until it completes
	2016-11-11 01:05:43:721 INFO House keeping finished	Housekeeping has been completed, the server is back online
Upcoming license expiry < 30 days contact Customer Support for issue of new licence key	2016-11-11 01:00:19:859 INFO Licence status: Licence OK. Expiry Date: 12 jul 2017 Grace Period End Date: 12 aug 2017	This identifies the license expiry date
Cases being received and interpreted regularly	2016-11-07 12:11:49:522 INFO caseWorkflow=interpreted, caseName=054430, systemId=1282024, panel=NF, project=Delta nierfunctie, rules=90, validation=MANUAL, commentIds=[415]	Each customer should determine what is an acceptable gap between cases being interpreted, ie, if no cases are interpreted within 1 hour during working hours, an alert should be sent to administrator flagging a potential issue
Available system and backup space	2016-11-10 10:48:21:643 INFO Available space for data: 74 GB	Available space in the directory used for all current RippleDown data, as specified by the DATA_DIR setting in the database.properties configuration file
	2016-11-10 10:48:21:658 INFO Available space for backup: 924 GB	Available space in the directory used for nightly backups, as specified by the BACKUP_DIR setting in the database.properties configuration file

## Abnormal log entries

Errors or other abnormal log entries can be found by a case-sensitive text search of "**WARN**", and "**ERROR**".

### Summary of known warnings / errors in Log files

Some abnormal log entries may be able to be handled on-site without assistance from PKS Support.

Please take the action outlined below and contact PKS Support or your IT department where indicated.

Entry	Meaning	Action
<b>Bad Messages received to RippleDown</b>		
<pre>\$DATE WARN Could not process the case caseId=id(*****)</pre>	<p>The Clinical Data Source has sent a message which RippleDown could not process as it does not comply with the interface specification.</p> <p>It contains an invalid field, character, or section and it cannot be processed by RippleDown.</p> <p>No report will be generated for this case.</p>	<p>Review the case name provided or the error file generated to determine source of the issue.</p> <p>If unclear, engage the Clinical Data Source vendor to investigate further.</p> <p>When the message has been corrected, resend to RippleDown.</p>
<pre>\$DATE WARN Could not parse message, which has been saved to file, as shown</pre>		
<pre>\$DATE**** WARN Could not get case for id: id(*****) from manager: _RippledwnServer *****</pre>		
<pre>\$DATE***** Bad*message saved in: *</pre>		
<pre>\$DATE** WARN Unparseable XML saved in error dir. Error follows: org.xml.sax.SAXParseException; lineNumber: *; columnNumber: ** Character reference "&amp;#"</pre>		
<pre>\$DATE WARN null interpretation for case id '*'</pre>		

Entry	Meaning	Action
<pre>java.lang.NullPointerException: Could not create case.</pre>		
<pre>\$DATE SEVERE Case processing failed for ***** for project '*****' java.lang.reflect.UndeclaredThrowableException</pre>		
<pre>\$DATE WARN Unable to create case for caseId: '*' java.lang.IllegalArgumentException: Could not parse ***** a range.</pre>		
<pre>\$DATE ***** Message has invalid episodes, saving in error directory... java.lang.IllegalArgumentException: ORM: Sample number *. Expected an OBR but got null</pre>		
<pre>\$DATE ERROR Message has invalid episodes, saving in error directory...</pre>		
<pre>\$DATE** WARN Could not get case for id: id(** from manager: *****</pre>		
<pre>\$DATE WARN Could not process case: unknown with id: id(*****) in queue: *****</pre>		



Entry	Meaning	Action
<b>Connectivity issues with the Clinical data source/Middleware</b>		
<pre>\$DATE**** WARN Sending socket message failed: *****, timeout: 180000. Error message was: End of stream reached.</pre>	<p><b>Warnings of connectivity issues with the source system.</b></p>	<p><b>Monitor connectivity between RippleDown and the Clinical Data Source/Middleware server.</b></p> <p><b>Contact Customer IT if problem persists</b></p>
<pre>\$DATE**** WARN Sending socket message failed: 10.*****:41099, timeout: 180000. Error message was: Connection reset</pre>		
<pre>\$DATE** SEVERE Could not send message to LIS</pre>		
<pre>\$DATE**** WARN Sending socket message failed: *****, timeout: 180000. Error message was: Software caused connection abort: socket write error</pre>		
<pre>\$DATE** WARN Sending socket message failed: *****, timeout: 180000. Error message was: Could not connect to: ***** on port: *****</pre>		
<pre>\$DATE WARN Could not send last ACK message. java.net.SocketException: *****: socket write error</pre>		

Entry	Meaning	Action
<pre>\$DATE WARN Sending socket message failed: 10.11.59.9:41099, timeout: 180000. Error message was: Software caused connection abort: recv failed</pre>		
<pre>\$DATE** WARN Sending socket message failed: 10.*****:41099, timeout: 180000. Error message was: Read timed out</pre>		
<pre>\$DATE*****Sending socket message failed: *, timeout* 180000. Error message was: Connection reset</pre>		
<pre>\$DATE WARN Could not send last ACK message. java.net.SocketException: *****: socket write error</pre>		
<pre>\$DATE WARN Response read timed out java.io.IOException: End of stream reached.</pre>		
<b>Licence Errors</b>		
<pre>\$DATE ERROR Licence in grace period. Expiry Date: 08 Oct 2018 Grace Period End Date: 07 Dec 2018</pre>	<p>The licence has entered a "grace period" and will expire soon</p>	<p>Contact PKS support before the grace period ends to obtain a new licence.</p>

Entry	Meaning	Action
<pre>\$DATE ERROR Licence out of grace period. Expiry Date: 08 Oct 2018 Grace Period End Date: 09 Oct 2018</pre>	<p>The licence has expired and the grace period has passed, so the server will shut down.</p>	<p>Apply the new licence issued by PKS for renewal purposes. If this cannot be located, contact PKS Support.</p>
<pre>\$DATE ERROR The licence file is not valid for this RippleDown version. Expiry Date: ***** Grace Period End Date: ****</pre>	<p>The licence does not match with the version of RippleDown installed.</p>	<p>Contact PKS Support confirming the version of the product installed.</p>
<p><b>General Warnings/Errors</b></p>		
<pre>\$DATE WARN Could not create RippledwnServer java.rmi.server.ExportException: Port already in use: 5814; nested exception is:</pre>	<p>The server could not start because another server is already running on this platform</p>	<p>Stop any other instance of the RippleDown Windows service or Unix/Linux daemon before trying to start another one.</p> <p>Stop and restart the RippleDown service. If the issue continues, contact PKS Support.</p>
<pre>\$DATE WARN Could not archive file: *</pre>	<p>File being processed could not be written to the archive.</p>	<p>Stop and restart the RippleDown service.</p> <p>Process another case and confirm this is correctly added to the archive. If not, contact PKS Support.</p>

Entry	Meaning	Action
<pre>\$DATE WARN Could not archive file: ****.in java.io.FileNotFoundException: \\****\****.in (Access is denied)</pre>	<p>The RippleDown server cannot write the specified file</p>	<p>Check that:</p> <ul style="list-style-type: none"> <li>the specified directory is mounted and available, and</li> <li>the RippleDown server process has write permission for the respective directory</li> </ul>
<pre>\$DATE WARN No project for panel code: **  \$DATE WARN caseWorkflow=query, description=Cannot interpret case as no project exists for this panel, caseName=****, systemId=****, panel=CHECK</pre>	<p>The message has a panel code which does not correspond to any online project in RippleDown Server</p>	<p>From the RippleDown Administrator client, add the project with the corresponding panel code or add the panel code to an existing online project.</p>
<pre>\$DATE WARN Could not send rd.log</pre>	<p>The log file could not be emailed to IT Administrator during housekeeping (as identified in the AESender.properties file</p>	<p>Check that</p> <ul style="list-style-type: none"> <li>The email server is still functioning</li> <li>RippleDown still has still correct email settings in the AESender.properties file</li> <li>The email server has not been setup to filter out or reject messages from the RippleDown server</li> </ul>
<pre>\$DATE WARN Could not archive file: &lt;filename&gt;</pre>	<p>A copy of an input or output file was not able to be stored.</p>	<p>Check to see if the directory is full, other processes are locking it, or if the account under which RippleDown is running does not have sufficient privileges to write files into the directory.</p>

Entry	Meaning	Action
<pre>\$DATE WARN Could not send log.txt.1 javax.mail.MessagingException: Could not convert socket to TLS;</pre>	<p>Email sending failure</p>	<p>The following RippleDown flags can be configured in the text file `server.vmoptions`, depending on your particular site requirements:</p> <p>Dmail.smtp.ssl.trust=xxx.xx.xx.xx</p> <p>where xxx.xx.xx.xx is the mail host name in &lt;<i>Rippledwn Installation directory</i>&gt;\rippledown\properties\AESender.properties</p>
<pre>\$DATE ERROR Could not rename C:\PKS\projects\backup\_RippledwnServer.rdf to C:\PKS\projects\backup\_RippledwnServer_bak_bak.rdf during backup</pre>	<p>Backup of named database was unsuccessful during overnight housekeeping</p>	<p>Review whether any process (e.g. virus scanner) may be locking this file at time of housekeeping.</p> <p>Stop and restart the RippleDown service. Run housekeeping manually</p> <p>Monitor following night for ongoing issues.</p>
<pre>\$DATE WARN Could not send email to john.doe@hospital.org.au,jane.smith@hospital.org.au with subject GDNA Test Request Notification javax.mail.MessagingException: Failed to set recipients;</pre>	<p>The comment set to be emailed to multiple recipients has failed as a limitation of 1 email (or one email group) can be entered.</p>	<p>Correct the email recipient details and resend.</p>

Entry	Meaning	Action
<pre>\$DATE WARN Could not write text report to '\\****\****'</pre>	<p>The RippleDown server cannot write the specified file</p>	<p>Check that:</p> <ul style="list-style-type: none"> <li>the specified directory is mounted and available</li> <li>the RippleDown server process has write permission for the respective directory</li> </ul>
<pre>\$DATE SEVERE Could not get core: ***</pre>	<p>The requested project could not be opened.</p>	<p>Stop and restart the service.</p> <p>If this does not resolve the issue, the corrupt project should be restored as follows:</p> <ol style="list-style-type: none"> <li>1. Stop the RippleDown service (if it is running)</li> <li>2. Go to the &lt;RippleDown installation&gt;\projects folder and move the corrupt database (identified by from the logs) out of the RippleDown installation directory. This should be moved to a backup location.</li> <li>3. Go to the &lt;RippleDown installation&gt;\projects\backup folder and copy the second last backup of the project database, e.g. KB_name.bak_bak.rdf. Remove the bak_bak from the file name and copy to the &lt;RippleDown installation&gt;\projects folder.</li> <li>4. To ensure the Audit Trail matches the backup copy of the project database, a copy of the Audit Trail (KB_name.mv.db) from the nightly server backup performed by your organisation, should be used to replace the Audit Trail in the &lt;RippleDown installation&gt;\projects folder. If a backup is not available,</li> </ol>

Entry	Meaning	Action
		<p>this step is not essential, but please note that the Audit Trail will contain erroneous entries if not replaced.</p> <p>5. Restart the RippleDown service, review the RippleDown logs for any exceptions, attempt to log into the Knowledge Builder.</p> <p>If service has been restored, confirm users are able to login to their respective RippleDown modules from their workstations. Notify <a href="mailto:support@pks.com.au">support@pks.com.au</a> of the incident and its resolution.</p>

**If any of these are present, and you cannot resolve the issue on-site as indicated below, contact PKS Support immediately.**

## Tracking activity using the log files

### Case processing

Log entries that document case processing have "caseWorkflow" as the first of their key-value pairs.

Step	Example	Explanation
receipt	<code>\$DATE INFO caseWorkflow=receipt, caseName=****, systemId=****</code>	<p>The case has just been received from the Clinical Data Source.</p> <p>A system id is assigned to the case. This can be used to track the progress of the case through RippleDown.</p>
interpreted	<code>\$DATE INFO caseWorkflow=interpreted, caseName=****, systemId=****, panel=NF, project=Delta nierfunctie, rules=90, validation=MANUAL, commentIds=[415]</code>	<p>A case has been interpreted by the named project (Knowledge Base).</p> <p>Generally, is immediately after a receipt entry.</p> <p>The validation status of the interpretation of the case is logged where "validation" means:</p> <p>FINAL =&gt; Auto-validated            MANUAL =&gt; Not auto-validated</p> <p>commentIds is a comma separated list.</p>



Step	Example	Explanation
enqueue	<code>\$DATE INFO caseWorkflow=Enqueue, caseName=****, systemId=****, queue=Default, project=Diabetes</code>	A case has been queued for review in the RippleDown validator.
rejected	<code>\$DATE INFO caseWorkflow=rejected, caseName=****, systemId=8, panel=Diab, project=Diabetes, source=Validator, storedInCore=true, interpretation="History of DM noted"</code>	The interpretation has been changed by a Validator user.
requestOk	<code>\$DATE INFO caseWorkflow=RequestOK, caseName=****, systemId=****, queue=Default, project=AProject, user="admin",</code>	A case has been checked in the RippleDown Auditor client and found to be error-free.
requestInError	<code>\$DATE INFO caseWorkflow=RequestInError, caseName=****, systemId=1234, queue=****, project=Auditor, user="****", errorMessages=["*Query resolved"], DataEntryOperator="****", SiteLocation=false</code>	A case has been checked in the RippleDown Auditor client and found to contain an error.
sent	<code>\$DATE INFO caseWorkflow=sent, caseName=****^****, systemId=****, panel=NF, project=****, interpretation="Normal lipid results."</code>	The interpretation for the case has been sent back to the clinical data source.

A case can be tracked by searching for a receipt entry with its lab number in the log file. This might find a number of entries:

- Another case for the same lab number but for a different panel.
- A resend of the case, with the same panel.

Once the receipt entry matching the case name (lab number) and panel code, all other processing for that case can be found by searching for the system id in the receipt entry.

The turnaround time for a case within RippleDown, can be calculated as the difference between the caseWorkflow=receipt and caseWorkflow=sent entries for a particular systemId.

If there is no "sent" entry for a case, perhaps it is in a RippleDown validation queue.

Apart from the records of cases in log files, all incoming and outgoing messages are archived in a sub-directory of the projects backup directory. These files can be used to get precise information as to what was received from and sent to the clinical data source. These are archived into zip files with a date stamp as part of the house-keeping process.

### User activity

User log in activity is captured as follows:

```
2016-11-10 08:00:42:458 INFO Logon attempt. User name: 'j.citizen' . IP: [10.0.0.00]. App: AC_VALIDATOR. Result: true. Client id: j.citizen1234567
```

Where log-in fails, the Result will be "false".  
User log off is not captured.

Once logged on, log entries that document user actions have an "app" entry that indicates the application and a "user" entry that gives the login name of the user.

For example, this series of log entries shows the admin user opening a project using the Knowledge Builder and then browsing cases from the rejected and archive case lists:

```
2016-11-07 16:14:29:655 INFO app=KB, user=admin, command=ProjectGet, project=Lever
2016-11-07 16:14:31:926 INFO app=KB, user=admin, command=CaseInterpret, caseList=Rejected, caseId=45680
2016-11-07 16:14:42:762 INFO app=KB, user=admin, command=CaseInterpret, caseList=Archive, caseId=280
```

Most of these entries are fairly self explanatory.

The Audit Trail tool in the Knowledge Builder, rather than the log files, formally records editing of RippleDown Knowledge Bases.

## Automatically generated emails

The following are the events that will automatically generate an email to a nominated support staff. The address of the email is specified by the TO\_PAGING value in the server configuration file AESender.properties. Multiple email addresses can be specified as a comma separated list:

TO\_PAGING=manager@pathology.com, administrator@pathology.com

Each event is also logged in the server log file, as described below:

Log event	Email message	Description	Support action
Internal error	Static initialiser of Keywords failed	Internal software error	Check the disk space, then restart the server. If the issue persists, contact PKS support
Could not record usage for case	Usage	Internal software error	Check the disk space, then restart the server. If the issue persists, contact PKS support
Could not commit day list db.	Could not commit day list db for {}	Archive database was not properly committed to the DB file.	Check the disk space, then restart the server. If the issue persists, contact PKS support
\$DATE SEVERE Could not get core: ***	(same as log event)	The requested project could not be opened.	Stop and restart the service. If this does not resolve the issue, contact PKS to arrange project restore from backup.

Log event	Email message	Description	Support action
			See details earlier in this document for restoration instructions.
RippleDown Web Server error	Unable to start Web Server for WAR apps, please adjust Server Settings and restart	RippleDown companion web server could not be started and therefore some functionality might not be available (REST interface, ...)	Check the disk space, then restart the server. If the issue persists, contact PKS support.
Licence in grace period.	Licence expiry detected in housekeeping: Licence in grace period.	License expired and a grace period started	If a new licence has been issued, this should be applied. If not, contact PKS support.
Licence out of grace period.	(same as log event)	License expired and a grace period finished.	If a new licence has been issued, this should be applied. If not, contact PKS support.
BACKUP FAILED	(same as log event)	The backup process of the databases failed.	Check the disk space, then restart the server. Run housekeeping manually. If the issue persists, contact PKS support

Log event	Email message	Description	Support action
Corrupt database detected: {}	Database saved to backup directory {}	A corrupted database has been detected and removed from the list of projects. It can be found on the path specified in the email.	<p>The corrupt project should be restored as follows:</p> <ol style="list-style-type: none"> <li>1. Stop the RippleDown service (if it is running)</li> <li>2. Go to the &lt;RippleDown installation&gt;\projects folder and move the corrupt database (identified by from the logs) out of the RippleDown installation directory. This should be moved to a backup location.</li> <li>3. Go to the &lt;RippleDown installation&gt;\projects\backup folder and copy the second last backup of the project database, e.g. KB_name.bak_bak.rdf. Remove the bak_bak from the file name and copy to the &lt;RippleDown installation&gt;\projects folder.</li> <li>4. To ensure the Audit Trail matches the backup copy of the project database, a copy of the Audit Trail (KB_name.mv.db) from the nightly server backup performed by your organisation, should be used to replace the Audit Trail in the &lt;RippleDown installation&gt;\projects folder. If a backup is not available, this step is not essential, but please note that the Audit Trail will contain erroneous entries if not replaced.</li> <li>5. Restart the RippleDown service, review the RippleDown logs for any exceptions, attempt to log into the Knowledge Builder.</li> </ol>

Log event	Email message	Description	Support action
			<p>If service has been restored, confirm users are able to login to their respective RippleDown modules from their workstations. Notify <a href="mailto:support@pks.com.au">support@pks.com.au</a> of the incident and its resolution.</p> <p>If you need further support, Contact PKS support.</p>
{} not identical	{} was not identical to original after compaction	<p>This problem is due to a case being processed just when housekeeping starts, so the DB is changed (maybe with some interpretation log entry) after the DB snapshot is taken. Hence the comparison of the current DB with this compacted snapshot fails.</p>	No action needed