

ACEMID Data Uploader – User Manual

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Overview

The **Australian Centre of Excellence in Melanoma Imaging & Diagnosis (ACEMID) Uploader** is a robust, automated system developed to streamline the transfer of ACEMID imaging data from a staging environment to a centralized XNAT server. This system is a critical component in the ACEMID data pipeline, ensuring that high-resolution imaging data is reliably and efficiently uploaded for further analysis and research.

Key features of the ACEMID Uploader include:

- **Real-time Monitoring:** Continuously observes the staging environment for new data.
- **Automated Upload Pipeline:** Executes scheduled uploads without manual intervention.
- **Intelligent Error Handling:** Detects and categorizes upload failures, enabling targeted reprocessing.
- **Comprehensive Logging:** Maintains detailed logs for auditing and troubleshooting.
- **Upload Verification:** Confirms the integrity and completeness of each data transfer.

Data Acquisition

The ACEMID data originates from the Canfield Vectra system, a sophisticated imaging platform that captures the entire exposed skin surface using an array of camera. This system is used in clinical settings to document and monitor skin conditions, particularly for melanoma diagnosis. Clinical staff utilize a GUI-based tool called VectraDBTool (see *figure 1*) to select and export patient data from the Vectra database.

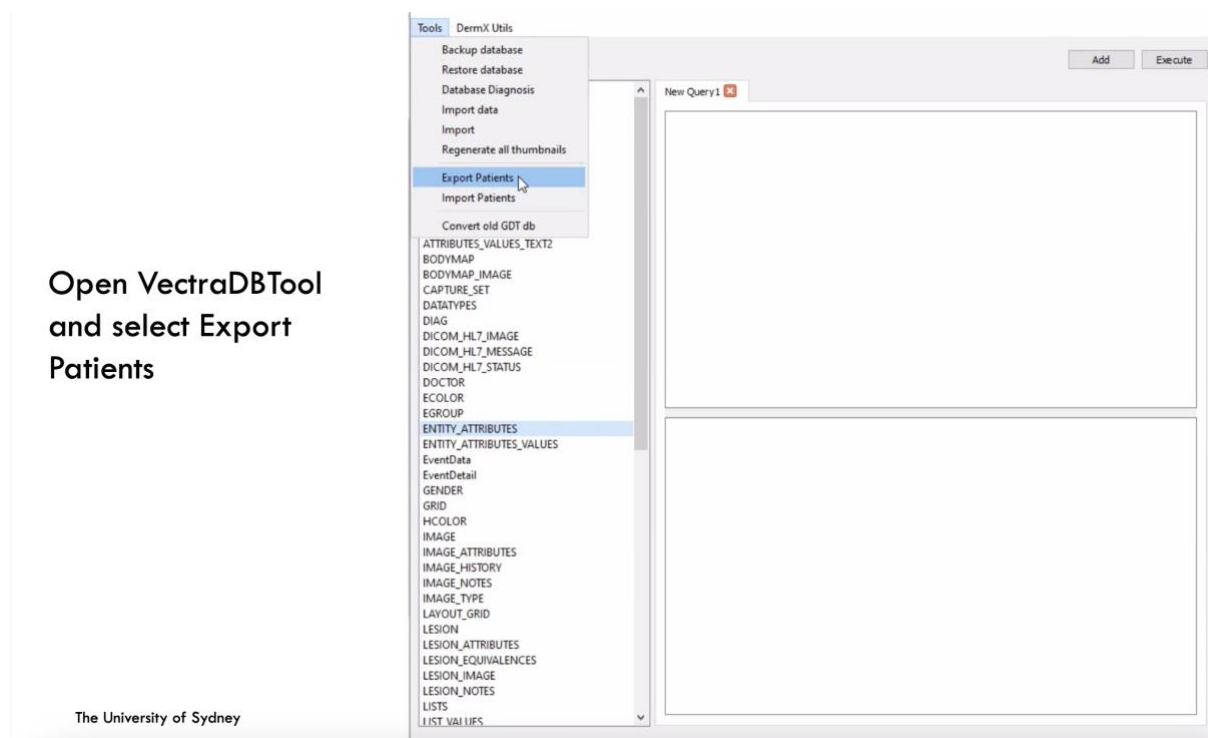


Figure 1: Export the patient ACEMID data from Canfield Vectra System

For each patient, the export process generates:

- One SQLite file containing metadata and clinical information
- One Patient folder containing high-resolution image files (see *figure 2*)

Export per participant

- 1 Folder with Images
- 1 SQLite file

Name	Date modified	Type	Size
7CCC58B3-4250-465F-87E2-BEE8DA4D8443	20/11/2023 9:30 AM	File folder	
9CC28CDA-CC43-45C2-B8B0-91550C21E87D	20/11/2023 9:30 AM	File folder	
520DE09C-C289-49CB-B4FC-F04CF8E792C	20/11/2023 9:30 AM	File folder	
5064268D-B8EB-43D8-BEEF-88C69EBA4846	20/11/2023 9:30 AM	File folder	
D6B174A8-0574-435B-B8D2-DB425B92418	20/11/2023 9:30 AM	File folder	
DCBD1813-A857-4321-B88E-3A334979FC24	20/11/2023 9:30 AM	File folder	
7CCC58B3-4250-465F-87E2-BEE8DA4D8443	20/11/2023 9:30 AM	Data Base File	1,794 KB
9CC28CDA-CC43-45C2-B8B0-91550C21E87D	20/11/2023 9:30 AM	Data Base File	1,564 KB
520DE09C-C289-49CB-B4FC-F04CF8E792C	20/11/2023 9:30 AM	Data Base File	1,790 KB
5064268D-B8EB-43D8-BEEF-88C69EBA4846	20/11/2023 9:30 AM	Data Base File	1,300 KB
D6B174A8-0574-435B-B8D2-DB425B92418	20/11/2023 9:30 AM	Data Base File	1,300 KB
7767-691_DCB01813-A857-4321-B88E-3A334979FC24	20/11/2023 9:30 AM	Data Base File	1,388 KB

Figure 2: The Exported ACEMID data with .db SQLite file and Patient folder

Staging Server Structure

Once exported, the data is placed on a staging server with the following directory structure (see *figure 3*):

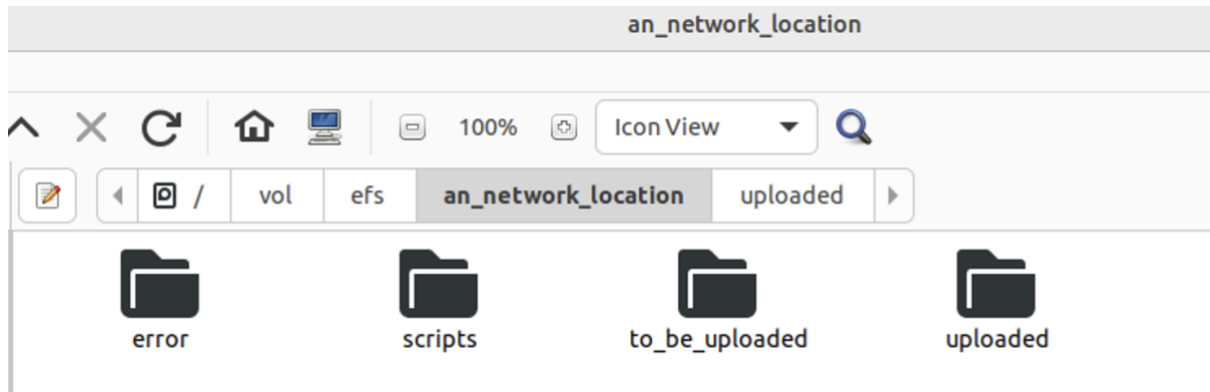


Figure 3: The folder structure of staging server for ACEMID data

- **to_be_uploaded/**: Contains newly exported patient data awaiting upload.
- **uploaded/**: Stores data that has been successfully uploaded to the XNAT server.
- **error/**: Stores data that failed to upload due to errors.
- **scripts/**: The ACEMID uploader bash scripts.

Upload Process

A cron job is scheduled to execute the ACEMID uploader scripts located in the **scripts/** directory. The uploader performs the following operations:

- Scans the **to_be_uploaded/** directory for new data.
- Initiates the upload process to the central XNAT server.
- Verifies the success of each upload.
- Moves successfully uploaded data to the **uploaded/** directory.
- Moves failed uploads to the **error/** directory.
- Another cron job to run the ACEMID uploader scripts on the **error/** directory.

The above process continues iteratively until the **to_be_uploaded/** directory is empty.

The flow chart below (see *figure 4*) outlines the steps involved in the ACEMID uploading process.

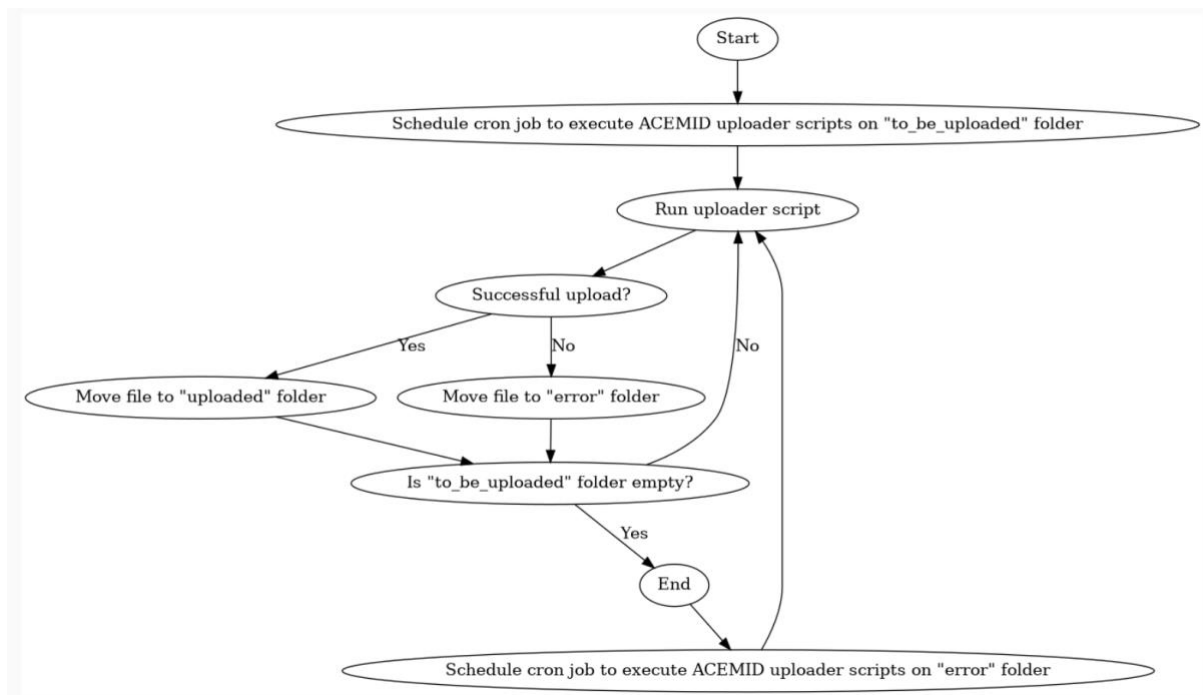


Figure 4: The flow chart of ACEMID upload process

The following pseudo (see *figure 5*) code outlines the logic of the ACEMID upload process.

```
1 BEGIN
2
3 // Cron Job 1: Process files in 'to_be_uploaded' folder
4 WHILE 'to_be_uploaded' folder is NOT empty DO
5     FOR each file IN 'to_be_uploaded' folder DO
6         RUN uploader_script(file)
7
8         IF upload_successful THEN
9             MOVE file TO 'uploaded' folder
10        ELSE
11            MOVE file TO 'error' folder
12        ENDIF
13    ENDFOR
14 ENDWHILE
15
16 // Cron Job 2: Process files in 'error' folder
17 WHILE 'error' folder is NOT empty DO
18     FOR each file IN 'error' folder DO
19         RUN uploader_script(file)
20
21         IF upload_successful THEN
22             MOVE file TO 'uploaded' folder
23        ELSE
24            LOG error
25            RETRY upload (optional: up to N times)
26            IF still unsuccessful THEN
27                NOTIFY admin OR log persistent failure
28            ENDIF
29        ENDIF
30    ENDFOR
31 ENDWHILE
32
33 END
34
```

Figure 5: The pseudo code for implementing the ACEMID upload process

Running ACEMID Uploader

Before running the uploader, ensure the following:

System Requirements

- Unix-like OS (Linux/macOS)
- Bash shell

XNAT Requirements

- Turn on the External Camera Session (xnat:xcSessionData) and External Camera Scan (xnat:xcScanData) data types (see *figure 6*).

Data Types

Setup Additional Data Type

Element	Singular	Plural	Code	Accessible	Secured	Searchable	Browseable	Sequence
xnat:nmScanData	nm scan data	nm scan data		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0
xnat:nmSessionData				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0
xnat:projectData	Project	Projects		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
xnat:smSessionData				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0
xnat:subjectData	Subject	Subjects		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0
xnat:xcScanData	External Camera Scan	External Camera Scan		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0
xnat:xcSessionData	External Camera Session	External Camera Session		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0
xnat:investigatorData				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
xnat:mrSessionData	MR Session	MR Sessions	MR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1
icr:roiCollectionData	ROI Collection	ROI Collections	ROIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
xnat:crSessionData	CR Session	CR Sessions	CR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
xnat:ctSessionData	CT Session	CT Sessions	CT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
xnat:petmrSessionData	PET MR Session	PET MR Sessions	PETM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
xnat:petSessionData	PET Session	PET Sessions	PET	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
xsync:xsyncAssessorData	XSync Assessor Data	XSync Assessor Data		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2
val:protocolData	Protocol Validation	Protocol Validations	PVAL	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
xnat:pVisitData	Visit	Visits	V	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
xnat:qcAssessmentData	Auto QC	Auto QCs	QC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
xnat:qcManualAssessorData	Manual QC	Manual QCs	MQC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3

Figure 6: Turn on the xnat:xcSessionData and xnat:xcScanData type

- Suggested to Set the User Session Timeout to be 60 minutes (see *figure 7*).

User Logins / Session Controls

USER SESSION CONTROLS

User Session Timeout
Interval for timing out user sessions. Uses [PostgreSQL interval notation](#).

Alias Token Timeout
Interval for timing out alias tokens. Uses [PostgreSQL interval notation](#).

Alias Token Timeout Schedule
How often to check alias tokens for timeout (0 0 * * * means it runs every hour). Uses basic [Cron notation](#) (lists and ranges aren't supported).

Session Timeout Message
Alert message provided to users after a session timeout. TIMEOUT_TIME will be replaced by the timeout time.

Maximum Concurrent Sessions
The maximum number of permitted sessions a user can have open simultaneously. Tomcat restart required to take effect.

Figure 7: User Session Timeout set to 60 minutes

Install the following dependencies using your package manager. For example, on Ubuntu: run

```
sudo apt update
sudo apt install csvkit pdftotext inotify-tools
```

- `curl` (for calling XNAT Restful APIs)
- `csvkit` (for processing the csv files)
- `pdftotext` (for converting PDF files to text files)
- `enscript` (for converting text files back to PDF files)
- `inotify-tools` (for monitoring changes to files and directories in real time)

Explanations of each bash script

(1) `ACEMID_uploader.sh` The main ACEMID bash script to upload the cleaned Vectra exported data files to your XNAT instance using `JSESSIONID`.

(2) `dermoscopy_data_upload.sh` The Bash script to upload the dermoscopy images (mainly in jpg or png) to your XNAT instance.

(3) `stage_server_monitor.sh` The bash script to monitor the exported data from Vectra system to your specified network drive to detect if there is any file or folder changes in real time and then it will trigger the upload script.

(4) `remove_phi_report.sh` The bash script used to remove the PHI info in the pdf reports.

(5) `Dockerfile` The Dockerfile used to build the docker image of the above bash scripts to run on different platforms.

Setup Instructions

(1) Clone the Repository

```
git clone https://github.com/Australian-Imaging-Service/acemid-uploader.git
cd acemid-uploader
```

(2) Configure Environment Variables

Export the following variables in your shell:

```
export XNAT_URL="your_xnat_url"
export USERNAME="your_xnat_username"
export PASSWORD="your_xnat_password"
export PROJECT_ID="your_xnat_project_id"
```

You can also modify the script directly to hardcode these values if preferred.

(3) Running the script

run `./your_ACEMID_uploader_script.sh` on the terminal after you have added the execute rights to the bash script.

Conclusion

The ACEMID Uploader is a vital component of the melanoma imaging data pipeline, providing a reliable, automated mechanism for transferring clinical imaging data to a centralized repository. Its design emphasizes robustness, transparency, and fault tolerance, ensuring that valuable clinical data is preserved and made available for research and diagnostic purposes.