# Introduction

This section outlines the purpose of this document.

## Purpose

This document shall describe the requirements and specifications for the creation of a database containing all relevant information for the cataloging of imagery flights meant for image detection. This document shall also consider the requirements for a script to automate the parsing of data from flight record files (JXL format) and insertion into the described database. All data formats shall be enumerated with full descriptions, where possible.

## Scope

This document is only concerned with the creation, implementation, and automated data entry of the database listed in the purpose. The database is intended to be used in corresponding systems, such as automated image recognition and web-based interfaces where users can manually detect objects. As such, any required database elements are out of the scope of this document, and shall be described in other documentation. Since the database can be queried by any software with access, no external connectors need to be defined.

## Definitions

[To be updated]

## References

[To be updated]

## System Overview

[To be updated]

# General Description

## Product Perspective

Related projects

## Product Functions

Functions of this project

## User Characteristics

Users that will use the system

## General Constraints

Limitations of development

## Assumptions and Dependencies

Things that may change the SRS

# Specific Requirements

## External Interface Requirements

This section covers all requirements for external interactions.

### User Interfaces

UI requirements

### Hardware Interfaces

HW requirements

### Software Interfaces

SW requirements

### Communication Interfaces

Comms interfaces

## Functional Requirements

This section enumerates the functional requirements of the software. All functional requirements must be satisfied by the software to meet the needs of the project.

### FREQ1 – Parse image data from a given JXL file

#### Introduction

The software shall be able to parse all image information from a JXL file, following the format listed in [CROSS REF]. Information for a single image is stored in three objects within the JXL file: ImageRecord, PhotoStationRecord, and PointRecord.

#### Inputs

A single JXL file, which shall be read by the software.

#### Processing

The parser shall process the entire JXL document tree, cross-referencing the ImageRecord, PhotoStationRecord, and PointRecord objects relating to a single image to gather all data for storage in the database.

#### Outputs

An array of Image objects for storage in the database.

#### Error Handling

Notifications shall be presented if the JXL file is unable to be read. Specifically, if the file is unable to be opened, the file is unable to be parsed, or no Image data is found within the JXL file.

### FREQ2 – Connection to the database

#### Introduction

In order to store persistent data, the parser shall connect with a MySQL database.

#### Inputs

The server name, user name, password, and database information for the connection to the MySQL database.

#### Processing

The inputs are used to connect to the database and create a persistent connection object.

#### Output

A persistent-connection object for connection to the database by other elements of the software.

#### Error Handling

Notifications shall be presented if the database connection fails, including any reasons returned by the database software. An error shall be thrown or an empty database object returned in the case of an error.

### FREQ3 – Insert Image objects into the database

#### Introduction

The software shall be able to insert Image objects into the database. Any Image already found to be within the database shall be ignored.

#### Processing

The

Table 1 shows the structure of the JXL document format, including the depth of each entity, the type of each entity, and the description of each entity. This structure and description is not to be considered definitive and shall be updated as new information becomes apparent.

|  |  |  |  |
| --- | --- | --- | --- |
| Lvl | Entity | Type | Description |
| 1 | JOBFile {  product,  TimeStamp,  jobName,  version,  productVersion,  FieldBook  } | - |  |
| 2 | PhotoInstrumentRecord {  TimeStamp,  ID  } | - | Information about the photo instrumentation. Appears to reference the UAV, not the camera.  ***Timestamp*** is the time the instrument record is recorded.  ***ID*** is the internal ID for the instrument record. |
| 3 | Type | String | Unknown. Appears to always be Aerial. |
| 3 | Model | String | Model of the photo instrument. Appears to always be Trimble UX5. |
| 3 | Serial | String | Serial number of the photo instrument. |
| 3 | FirmwareVersion | String | Firmware version of the photo instrument. |
| 3 | UserDefinedName | String | Unknown. Appears to always be Prototype. |
| 2 | CameraDesignRecord {  TimeStamp,  ID  } | - | Manufacturer and capability information related to a camera used to take images.  ***Timestamp*** is the time the camera design was recorded.  ***ID*** is the internal ID of the camera design. |
| 3 | Type | String | Model of the camera. |
| 3 | HeightPixels | Int | Source height of the camera images. |
| 3 | WidthPixels | Int | Source width of the camera images. |
| 3 | PixelSize | Float | Real size of each pixel of the camera. Extremely small. |
| 3 | LensModel | String | Type of lens used on the camera. Appears to always be Rectilinear. |
| 3 | NominalFocalLength | Float | Nominal focal length of the camera. |
| 2 | CameraRecord2 {  TimeStamp,  ID  } | - | Used throughout the JXL to reference a specific camera that was used to take images.  ***Timestamp*** is the time the camera record was recorded.  ***ID*** is the internal identifier for the camera record. |
| 3 | CameraDesignID | Int | ID of the CameraDesignRecord related to this camera. |
| 3 | CameraPosition | Int | Unknown. Appears to always be 01. |
| 3 | Optics | - |  |
| 4 | IdealAngularMagnification | Float | Unknown. Appears to always by 1.0. |
| 4 | AngleSymmetricDistortion | - |  |
| 5 | Order3 | Float | Unknown. |
| 5 | Order5 | Float | Unknown. |
| 5 | Order7 | Float | Unknown. |
| 5 | Order9 | Float | Unknown. |
| 4 | AngleDecenteringDistortion | - |  |
| 5 | Column | Float | Unknown. |
| 5 | Row | Float | Unknown. |
| 3 | Geometry | - |  |
| 4 | PerspectiveCenterPixels | - |  |
| 5 | PrincipalPointColumn | Float | Unknown. |
| 5 | PrincipalPointRow | Float | Unknown. |
| 5 | PrincipalDistance | Float | Unknown. |
| 4 | VectorOffset | - |  |
| 5 | X | Float | Unknown. |
| 5 | Y | Float | Unknown. |
| 5 | Z | Float | Unknown. |
| 4 | BiVectorAngle | - |  |
| 5 | XX | Float | Unknown. |
| 5 | YY | Float | Unknown. |
| 5 | ZZ | Float | Unknown. |
| 2 | PointRecord {  TimeStamp,  ID  } |  | Location information for an image.  ***Timestamp*** is the time the image was taken.  ***ID*** is the internal identifier for this point record. |
| 3 | Name | String | The name of the image (without the .JPG extension). |
| 3 | Code |  | Unknown. |
| 3 | Method | String | Method for the location data. Appears to always be Coordinates. |
| 3 | SurveyMethod | String | Method for the survey. Appears to always be Autonomous. |
| 3 | Classification | String | Unknown. Appears to always be Normal. |
| 3 | Deleted | Bool | Unknown. Appears to always be false. |
| 3 | WGS84 | - | Holds the location information. May dependent on the Method. |
| 4 | Latitude | Float | Latitude location. |
| 4 | Longitude | Float | Longitude location. |
| 4 | Height | Float | Height from which the image was recorded. See Environment for distance unit. |
| 2 | PhotoStationRecord {  TimeStamp,  ID  } |  | Holds information about the instrumentation and orientation for an image.  ***Timestamp*** is the time the image was taken.  ***ID*** is the internal identifier for the photo station record. |
| 3 | StationName | String | The name of the image (without the .JPG extension). |
| 3 | InstrumentHeight | 0 | Unknown. Appears to always be 0. |
| 3 | RawInstrumentHeight | - |  |
| 4 | MeasurementMethod | String | Unknown. Appears to always be TrueHeight. |
| 4 | MeasuredHeight | 0 | Unknown. Appears to always be 0. |
| 4 | HorizontalOffset | 0 | Unknown. Appears to always be 0. |
| 4 | VerticalOffset | 0 | Unknown. Appears to always be 0. |
| 3 | InstrumentID | Int | ID of the instrument used. See: PhotoInstrumentRecord. |
| 3 | AtmosphereID | 0 | Unknown. Appears to always be 0. |
| 3 | StationType | String | Unknown. Appears to always be RawSensorValues. |
| 3 | DeviceAxisOrientationData | - |  |
| 4 | DeviceAxisOrientation | - |  |
| 5 | BiVector | - |  |
| 6 | XX | Float | X-axis rotation during imaging. (roll) |
| 6 | YY | Float | Y-axis rotation during imaging. (pitch) |
| 6 | ZZ | Float | Z-axis rotation during imaging. (yaw) |
| 4 | MeasurementMethod | String | Unknown. Appears to always be TrueHeight. |
| 4 | MeasuredHeight | 0 | Unknown. Appears to always be 0. |
| 4 | HorizontalOffset | 0 | Unknown. Appears to always be 0. |
| 4 | VerticalOffset | 0 | Unknown. Appears to always be 0. |
| 2 | ImageRecord {  TimeStamp,  ID  } |  | Information about the image itself.  ***Timestamp*** is the time the image was taken.  ***ID*** is the internal identifier for the image record. |
| 3 | StationID | String | ID of the PhotoStationRecord for this image. |
| 3 | BackBearingID | - | Unknown. Appears to always be empty. |
| 3 | CameraID | Int | ID of the CameraRecord2 used to take this image. |
| 3 | PointRecordID | - | Unknown. Appears to always be empty. |
| 3 | FileName | String | Filename for the image, with .JPG extension. |
| 3 | HorizontalAngle | - | Unknown. Appears to always be empty. |
| 3 | VerticalAngle | - | Unknown. Appears to always be empty. |
| 3 | Width | Int | Width of the stored image. |
| 3 | Height | Int | Height of the stored image. |
| 3 | SourceX | Int | Unknown. Appears to always be 0. |
| 3 | SourceY | Int | Unknown. Appears to always be 0. |
| 3 | SourceWidth | Int | Width of the original device image. |
| 3 | SourceHeight | int | Height of the original device image. |
| 2 | AtmosphereRecord {  TimeStamp,  ID  } |  | Atmospheric information recorded by the device.  ***Timestamp*** is the time that the atmospheric record was recorded.  ***ID*** is the internal identifier for the atmospheric record. |
| 3 | Pressure | - | Unknown. Appears to always be empty. |
| 3 | Temperature | - | Unknown. Appears to always be empty. |
| 3 | PPM | - | Unknown. Appears to always be empty. |
| 3 | ApplyEarthCurvatureCorrection | - | Unknown. Appears to always be false. |
| 3 | ApplyRefractionCorrection | - | Unknown. Appears to always be false. |
| 3 | RefractionCoefficient | 0 | Unknown. Appears to always be 0. |
| 3 | PressureInputMethod | String | Unknown. Appears to always be ReadFromInstrument. |
| 2 | FlightMissionRecord {  TimeStamp,  ID  } | - | ***Timestamp*** is the time the flight mission record was saved.  ***ID*** is the internal identifier for the flight mission record. |
| 3 | Name | String | Name of the flight, which is used to create the JXL filename. |
| 3 | FlightBlock {  endTime,  name,  startTime  } | - |  |
| 4 | FlightPlan {  percentLateralOverlap,  percentForwardOverlap,  height  } | - |  |
| 5 | Node {  latitude,  longitude  } | - |  |
| 4 | StationList | - |  |
| 5 | StationID | Int | ID of each PhotoStationRecord for each image taken on this flight. |
| 1 | Reductions | - | Unknown. Appears to always be empty. |
| 1 | Environment | - |  |
| 2 | DisplaySettings | - | Unknown. Appears to always be empty. |
| 3 | DistanceUnits | String | Unit of measure for distances. Appears to always be Metres. |
| 3 | HeightUnits | String | Unit of measure for heights. Appears to always be Metres. |
| 3 | AngleUnits | String | Unit for angles. Appears to always be DecimalDegrees. |
| 3 | AzimuthFormat | String | Unknown. Appears to always be Azimuth. |
| 3 | LatitudeLongitudeUnits | String | Unit of measure for lat/long. Appears to always be DecimalDegrees. |
| 3 | CoordinateOrder | String | Ordering for co-ordinates. Appears to always be North-East-Elevation. |
| 3 | TemperatureUnits | String | Unit of measure for temperature. Appears to always be Celsius. |
| 3 | PressureUnits | String | Unit of measure for pressure. Appears to always be MiliBar. |
| 3 | GradeUnits | String | Unknown. Appears to always be Percentage. |
| 3 | AreaUnits | String | Unit of measure for areas. Appears to always be SquareMetres. |
| 3 | StationFormat | String | Unknown. Appears to always be 1+000.0. |
| 2 | JobSettings | - |  |
| 3 | NeighbourhoodAdjustment | - | Unknown. |
| 4 | Applied | Bool | Unknown. Appears to always be false. |
| 4 | WeightExponent | 0 | Unknown. Appears to always be 0. |
| 2 | TimeZone | - | Timezone information for the flight. |
| 3 | ZoneName | - | Unknown. Appears to always be empty. |
| 3 | HoursToUTC | Int | Difference in hours from UTC for the flight. |
| 2 | CoordinateSystem | - |  |
| 3 | SystemName | String | Unknown. Appears to always be Default. |
| 3 | ZoneName | String | Unknown. Appears to always be Default. |
| 3 | DatumName | String | Unknown. Appears to always be WGS 1984. |
| 3 | Ellipsoid | - |  |
| 4 | EarthRadius | Int | Radius of the Earth. Appears to always be 6378137. |
| 4 | Flattening | Float | Unknown. Appears to always be 0.00335281067183. |
| 3 | Projection | - |  |
| 4 | Type | String | Unknown. Appears to always be NoProjection. |
| 4 | Scale | 1 | Unknown. Appears to always be 1. |
| 4 | GridOrientation | String | Unknown. Appears to always be IncreasingNorthEast. |
| 4 | SouthAzimuth | Bool | Unknown. Appears to always be false. |
| 4 | ApplySeaLevelCorrection | Bool | Unknown. Appears to always be false. |
| 3 | LocalSite | - |  |
| 4 | Type | String | Unknown. Appears to always be Grid. |
| 4 | ProjectLocationLatitude | - | Unknown. Appears to always be empty. |
| 4 | ProjectLocationLongitude | - | Unknown. Appears to always be empty. |
| 4 | ProjectLocationHeight | - | Unknown. Appears to always be empty. |
| 3 | Datum | - | Information about the GPS location system used. |
| 4 | Type | String | Unknown. Appears to always be ThreeParameter. |
| 4 | GridName | String | Unknown. Appears to always be WGS 1984. |
| 4 | Direction | String | Unknown. Appears to to always be WGS84ToLocal. |
| 4 | TranslationX | 0 | Unknown. Appears to always be 0. |
| 4 | TranslationY | 0 | Unknown. Appears to always be 0. |
| 4 | TranslationZ | 0 | Unknown. Appears to always be 0. |
| 3 | HorizontalAdjustment | - |  |
| 4 | Type | String | Unknown. Appears to always be NoAdjustment. |
| 3 | VerticalAdjustment | - |  |
| 4 | Type | String | Unknown. Appears to always be NoAdjustment. |
| 3 | CombinedScaleFactor | - |  |
| 4 | Location | - |  |
| 5 | Latitude | - | Unknown. Appears to always be empty. |
| 5 | Longitude | - | Unknown. Appears to always be empty. |
| 5 | Height | - | Unknown. Appears to always be empty. |
| 4 | Scale | - | Unknown. Appears to always be empty. |

Table : JXL Structure Definition