

BC MOEP Reader/Writer

The British Columbia (BC) Ministry of Environment and Parks (MOEP) format is a compact binary format used in the province of B.C., Canada. MOEP features have few attributes, one of which is a feature code which encodes the feature's properties. MOEP files can store only integer coordinates.

- The MOEP Reader and Writer modules provide the Feature Manipulation Engine (FME) with the capability to read and write files in binary MOEP format, with either 16-bit or 32-bit integer coordinates. Support for ASCII MOEP files is not provided.

Note: Throughout this section, a binary MOEP file will be referred to simply as an MOEP file; this reader/writer provides no support for ASCII MOEP files.

Overview

Each MOEP file starts with a small header, which is immediately followed by a sequence of geometric features. The header contains information which is global to the MOEP file, including a file type, a name for the content of the file such as, a mapsheet ID, and whether the coordinates are specified with 16-bit or 32-bit integers. Each feature has a feature code, a single optional attribute, a geometric type, such as point, line, text, etc., and some type-specific information, like coordinates, rotation, text size, etc.

The FME considers an MOEP data set to be a collection of MOEP files in a single directory.

MOEP files are referred to in the mapping file by IDs rather than by physical file names. The mapping between IDs and physical names is defined by the MOEP file definition lines within the mapping file.

BC MOEP Quick Facts

Format Type Identifier	MOEP
Reader/Writer	BC MOEP
Licensing Level	Both
Dependencies	Base
Dataset Type	None
Feature Type	Directory or File
Typical File Extensions	File base name
Automated Translation Support	.arc, .bin
User-Defined Attributes	Yes for Reader No for Writer
Coordinate System Support	No
Generic Color Support	No
Spatial Index	No
Schema Required	Never
Transaction Support	Yes
Geometry Type Attribute	No

Geometry Support			
Geometry	Supported?	Geometry	Supported?
aggregate	no	point	yes
circles	no	polygon	no
circular arc	no	raster	no
donut polygon	no	solid	no
elliptical arc	no	surface	no
ellipses	no	text	yes
line	yes	z values	yes
none	no		

Reader Overview

The MOEP reader produces FME features for all the feature data held in MOEP files residing in a given directory. The MOEP reader first scans the directory it is given for the MOEP files which have been defined in the mapping file. For each MOEP file that it finds, it checks to see if it the ID corresponding to the file is requested by looking at the list of IDs specified in the mapping file. If a match is found or if no IDs were specified in the mapping file, the MOEP file is opened for read. The MOEP reader extracts features from the file one at a time, and passes them on to the rest of the FME for further processing. When the file is exhausted, the MOEP reader starts on the next file in the directory.

Reader Directives

The suffixes shown below are prefixed by the current <ReaderKeyword> in a mapping file. By default, the <ReaderKeyword> for the MOEP reader is MOEP.

DATASET

Required/Optional: *Required*

The value for this directive is the directory name of the input MOEP files, or a single MOEP file to be read. A typical mapping file fragment specifying an input MOEP data set looks like:

```
MOEP_DATASET /usr/data/moep/92i080
```

or

```
MOEP_DATASET /usr/data/moep/92i080/92i080a.bin
```

Workbench Parameter: [<WorkbenchParameter>](#)

DEF

Required/Optional: *Optional*

The definition specifies the ID to use to refer to the file, along with the physical file name and its extension. In addition to the file name, other global attributes from the table below can be specified in the definition. When additional attributes are specified for an MOEP file being read, the reader will generate warnings if the specified values do not match those specified in the file's header. The writer uses the global attributes to fill in the header of the MOEP file being written.

The syntax of an MOEP DEF line is:

```
<ReaderKeyword>_DEF <fileID> \
  MOEP_FILENAME <physFileName> \
  [<attrName> <attrVal>]*
```

The following table shows the supported global attributes:

Attribute Name	Description
MOEP_FILENAME	Name of physical file within MOEP data set.
MOEP_RESOLUTION	The size of integer used to represent each X and Y coordinate value within the MOEP file. This can be either 16 or 32, indicating 16-bit or 32-bit integers, respectively. Z coordinates are always 16 bits, regardless of this attribute's value.
MOEP_FILE_TYPE	An integer in the range 0..9 denoting the type of data this file contains.
MOEP_NAME	An ASCII string 0 to 11 characters in length, providing a logical name for the file. This is stored in the file's header; it typically contains a mapsheet ID.

Attribute Name	Description
MOEP_FORCE_TYPE5	This optional attribute must be set to either <i>yes</i> or <i>no</i> . The default is <i>no</i> . If it is <i>yes</i> , a type 5 attribute record is written with each feature, even if it is empty.
MOEP_DATE	The date of submission of the MOEP file. The format for this date is YYYYMMDD, where YY is the last two digits of the year, MM is the month (01-12), and DD is the day within the month (01-31).
MOEP_OFFSET_MINIMUM	The MOEP writer module uses this value to determine the origin from which 16-bit (X,Y) coordinates are measured. As features are written to the MOEP file, their minimum bounding rectangle is maintained; once the MBR is larger than MOEP_OFFSET_MINIMUM in both the X and Y directions, its centre point is chosen as the origin for all coordinates written to the file. This attribute has no effect on 32-bit coordinates, which are always measured from (0,0).

The following mapping file fragment defines two MOEP files, one containing DEM data with 16-bit coordinates, and one containing contours, with 32-bit coordinates:

```

MOEP_DEF dem_data MOEP_FILENAME 92b053d.arc \
MOEP_FILE_TYPE 1 \
MOEP_RESOLUTION 16 \
MOEP_NAME 92b053d \
MOEP_DATE 960913 \
MOEP_OFFSET_MINIMUM 1000
MOEP_DEF contour_data MOEP_FILENAME 92b053t \
MOEP_FILE_TYPE 2 \
MOEP_RESOLUTION 32 \
MOEP_NAME 92b053t \
MOEP_DATE 960913

```

IDs

Required/Optional: *Optional*

This optional specification is used to limit the available and defined MOEP files read. If no IDs are specified, then all defined and available MOEP files are read. The syntax of the IDs keyword is:

```

<ReaderKeyword>_IDs<fileID1>\
    <fileID1> ... \
    <fileIDn>

```

The fileIDs must match those used in DEF lines.

The example below selects only the *dem_data* MOEP file for input during a translation:

```
MOEP_IDS dem_data
```

Workbench Parameter: [<WorkbenchParameter>](#)

Writer Overview

The MOEP writer creates and writes feature data to MOEP files in the directory specified by the `DATASET` keyword. If the directory did not exist before the translation, the writer will create it. Any old MOEP files in the directory will be overwritten with the new feature data. The FME determines which file features are to be written to as they are routed to the MOEP writer. Many MOEP files can be written during a single FME session.

Writer Directives

The MOEP writer processes the `DATASET` and `DEF` directives as described in the *Reader Directives* section. Unlike the reader, the MOEP writer requires `DEF` directives to be specified. It does not make use of the `IDs` directive.

Feature Representation

In addition to the generic FME feature attributes that FME Workbench adds to all features (see *About Feature Attributes* on page 7), this format adds the format-specific attributes described in this section.

Special FME attributes are used to hold the parameters specific to MOEP features. The MOEP writer uses these attributes to define aspects of the geometries of the features it writes out, and the MOEP reader will define these attributes from the MOEP features it reads.

One of these attributes is an optional user attribute which can contain up to 66 characters of arbitrary data.

FME considers the ID of the MOEP file to be the *FME feature type* of an MOEP feature. The feature type of an MOEP feature must match the ID of an MOEP file defined by an MOEP `DEF` line.

Every MOEP feature, regardless of its geometry type, shares the parameters shown in the following table. Subsequent subsections will describe parameters specific to each feature type.

Attribute Name	Contents
<code>moep_type</code>	The type of the geometry for the feature. This attribute will contain one of: <code>moep_line</code> <code>moep_contour_line</code> <code>moep_point</code> <code>moep_text</code> <code>moep_arc</code>
<code>moep_code</code>	Character string with up to 10 characters designating the feature code of the feature. If this is not specified for a feature being written, the feature will have the same feature code as the feature which was most recently written to the MOEP file.
<code>moep_attribute</code>	An optional attribute (MOEP type 05 feature) which can contain up to 66 characters of arbitrary text. (See also the <code>moep_font</code> , <code>moep_weight</code> , and <code>moep_text_group</code> attributes defined on <code>moep_text</code> features.)

Line Features

moep_type: moep_line

MOEP line features have two or more coordinates. FME features with an moep_type of moep_line correspond to non-contour MOEP features with a type of 02, 03, 12, or 13; the moep_display_type and moep_line_type differentiate between the different types.

The following attributes are defined for moep_line features:

Attribute Name	Contents
moep_display_type	Determines whether the line is a primary line or a duplicate. Legal values are primary and construction. The default is primary.
moep_line_type	Determines whether the MOEP feature is simple or complex (curvilinear). Legal values are curve and line. The default is line.

Contour Features

moep_type: moep_contour_line

MOEP contour line features have three or more coordinates. FME features with an moep_type of moep_contour correspond to MOEP features with a type of 02, 03, 12, or 13 which are represent contour data; the moep_display_type and moep_line_type differentiate between the different types.

Aside from the moep_line_type and moep_display_type attributes that contour lines inherit from moep_line features, the following attribute is defined for moep_contour_line features:

Attribute Name	Contents
moep_contour_elevation	The elevation of the contour line.

Point Features

moep_type: moep_point

In addition to an (X, Y, Z) location, an MOEP point has some additional attributes which affect the display of its point symbol. The symbol will always be centred around its location, but can be rotated and/or scaled, in both the X and Y directions.

Attribute Name	Contents
moep_rotation	Determines the rotation applied to the point symbol, measured in degrees counterclockwise from horizontal. The default is 0.0 degrees.
moep_scale_x	Multiplier applied to scale the point symbol in the X direction.(If this is not provided, it defaults to 1.0.

Attribute Name	Contents
moep_scale_y	Multiplier applied to scale the point symbol in the Y direction. If this is not provided, it defaults to 1.0.

Arc Features

moep_type: moep_arc

MOEP arc features represent a directed circular segment between two points on an ellipse. The representation of an arc is a set of three (X,Y,Z) coordinates—start of arc, end of arc, and origin of arc—along with a the direction of the arc.

Attribute Name	Contents
moep_sweep_direction	The direction in which the arc is drawn. Legal values are <code>clockwise</code> and <code>counterclockwise</code> . The default is <code>clockwise</code> .

Text Features

moep_type: moep_text

MOEP text features represent textual annotation placed at specific world coordinates. The full specification of the geometry includes an (X,Y,Z) position, the rotation of the text, the text string itself, the size of the text, and a specification of font, weight, and text group number.

Attribute Name	Contents
moep_rotation	Determines the rotation applied to the text, measured in degrees counterclockwise from horizontal.
moep_text_string	The characters which make up a line of the text feature. The maximum length of a line of text is 66 characters. Several text features can be grouped into a single feature using the <code>moep_text_group</code> attribute.
moep_text_size	The size of the text feature, measured in ground metres.
moep_font	Specifies a font number for the text, an integer in the range 0..99. See the discussion below this table regarding the encoding of font, weight, and text group.
moep_weight	Specifies the weight of the text, an integer in the range 0..99. See the discussion below this table regarding the encoding of font, weight, and text group.
moep_text_group	Specifies a group number; several text features can be logically grouped together by giving them the same group number. This number is a five digit, decimal integer. See the discussion below this table regarding the encoding of font, weight, and text group.

It is important to note the relationship between the font, weight, text group, and the optional attribute for the feature. If font, weight, and text group attributes are specified, MOEP uses the optional attribute of a text feature to store their values. When these are specified, the format of the attribute string is FFFWWWGGGGGG, where FFF is the font number, WWW is the weight, and GGGGGG is the text group number. Each number is right-justified in its field, padded to the left with spaces as necessary.

Similarly, when reading a text feature the optional attribute, if present, is broken down into a font, weight, and text group.