

BIRDxxx_UsageOutFix_3.txt

BIRD ID#: xxx
ISSUE TITLE: Usage Out Syntax Correction
REQUESTER: Arpad Muranyi, Mentor Graphics, Inc.
DATE SUBMITTED: January ??, 2012
DATE REVISED:
DATE ACCEPTED BY IBIS OPEN FORUM:

STATEMENT OF THE ISSUE:

The IBIS specification's definition for Usage Out parameters states that "Parameter is Output only from executable", but it is not clear whether this means "output only", as opposed to input or I/O, or whether this means "output coming only from executable", meaning that the source of the data can only be the AMI executable model and nothing else.

Consequently questions arise about the purpose of the <data> in the .ami file for Usage Out parameters. Is this <data> supposed to be used for initializing something, and if so what and how? Related to this, the meaning of "Default" needs to be clarified also, because it is not clear whether it means "default value" for the initialization mentioned above, or whether it means "default pick" for multi-valued parameters, such as Format Range, List, Increment, Steps for the case when the user doesn't make a selection before a simulation is started.

Depending on what the answer is to the above questions, one might also wonder whether the .ami parameter file should contain a value for Usage Out parameters at all. The general syntax for AMI parameters does not distinguish between Usage Out and any other Usage types, which implies that <data> is required for all Usage types. This creates a conflict with one of the possible interpretations that the only source of the Usage Out parameter <data> is the AMI model.

STATEMENT OF THE RESOLVED SPECIFICATIONS:

EDA tool may ignore ({Format} <data_format> <data>) for Usage Out because the <data> is coming from the algorithmic model
- except for Table which is used for formatting purposes (BIRD 132)

Corner should not be allowed for Usage Out
- since AMI model is not aware of EDA tool's simulation corner

Default and Value are synonyms (no special meaning given to Default)

Default is only a picker for multi valued data when user doesn't pick
- therefore it is not allowed for Usage Out parameters for which the user does not make any selections

Since BIRD 127.4 contains significant modifications in this area of the IBIS specification, some of the resolutions described here are to be applied to BIRD 127.4 as indicated.

On pg. 140 of the IBIS v5.0 specification, change these lines:

```
| Usage: (required for model specific parameters)
|   In      Parameter is required Input to executable
|   Out     Parameter is Output only from executable
|   Info    Information for user or EDA platform
|   InOut   Required Input to executable. Executable may return different
|           value.
```

to:

```
| Usage: (required for model specific parameters)
|*   In      Parameter value is a required input to the AMI model
|*   Out     Parameter value is coming from the AMI model
|   Info    Information for user or EDA platform
|*   InOut   Parameter value is a required input to the AMI model.
|*           The AMI model may return a different value.
```

On pg. 140 of the IBIS v5.0 specification, change these lines:

```
|   Corner   <typ value> <slow value> <fast value>
```

to:

```
|   Corner   <typ value> <slow value> <fast value>
|*           Corner is not allowed with Usage Out parameters
```

In BIRD 127.4, change these lines:

```
| Default <value>:
|*   Default and Value are mutually exclusive, and must not be used together
|*   for the same parameter. Default is not allowed for Table, Gaussian,
|*   Dual-Dirac and DjRj. Default is optional for Range, List, Corner,
|*   Increment and Steps. If a Default <value> is specified, its value must
|*   have the same Type as the parameter. For example, if Type is Boolean,
|*   <value> must be either True or False, if Type is Integer, <value> must
|*   be an integer. Also, if Default is specified, <value> must be a member
|*   of the set of allowed values of the parameter. If Default is not
|*   specified, the default value of the parameters will be the <typ> value.
```

to:

```
| Default <value>:
|*****When used with single value data, Default and Value are mutually
|*   exclusive, and must not be used together for the same parameter.
|*****In these situations, Default is a synonym of Value and does not imply
|*****any additional meaning or actions. Default is not allowed for any Usage
|*****Out parameter types, and Table, Gaussian, Dual-Dirac and DjRj. Default
|*****is optional for Range, List, Corner, Increment and Steps. When Default
|*****is specified for any of these parameter types, it shall be used by the
|*****EDA tool to pick one value from all the possibilities for that parameter
|*****if the user does not make such a selection.
|*
```

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```
|* If a Default <value> is specified, its value must have the same Type as
|* the parameter. For example, if Type is Boolean, <value> must be either
|* True or False, if Type is Integer, <value> must be an integer. Also, if
|* Default is specified, <value> must be a member of the set of allowed
|* values of the parameter. If Default is not specified, the default value
|* of the parameters will be the <typ> value.
```

In BIRD 127.4, change these lines:

```
|* All parameters must be in the following format:
|*
|* (parameter_name (Usage <usage>)
|* (Type <data_type>)
|* ({Format} <data_format> <data>)
|* (Default <value>)
|* (Description <string>))
|*
|* Notes:
|* 1) The order of the entries is not important.
|* 2) The word Format is optional as indicated by the curly
|* braces "{" and "}" and may be ignored by the EDA tools.
|* (The examples do not show the word Format).
|* 3) Certain reserved parameter names allow only certain
|* <data_format> selections, as described below.
|* 4) The <data_format> selection of Value and Default are
|* always mutually exclusive. Certain parameters may require
|* Value or Default, but Value and Default are not allowed to
|* be present together for the same parameter.
|* 5) <data_format> is always required for selections other
|* than Value.
|* 6) Default is optional for <data_format> Range, List, Corner,
|* Increment and Steps.
|* 7) Default is not allowed for <data_format> Table, Gaussian,
|* Dual-Dirac and DjRj.
|** 8) Additional rules apply when <data_format> is Table. The
|** format for <data> describes a set of rows containing data
|** values. Each row has its set of column data values enclosed
|** by parentheses '(' and ')'. Each row contains the same
|** number of column values. Any or all of these columns may
|** have different data types. For this case the <data_type>
|** argument is either a list of data types (one for each
|** column), or a single data type. If it is a single data
|** type then this type shall be applied to all of the columns
|** in each row.
|*** 9) Description is optional.
```

to:

```
|* All parameters must be in the following format:
|*
|* (parameter_name (Usage <usage>)
|* (Type <data_type>)
|* ({Format} <data_format> <data>)
|* (Default <value>)
|* (Description <string>))
|*
|* Notes:
```

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- |* 1) The order of the entries is not important.
- |* 2) The word Format is optional as indicated by the curly braces "{" and "}" and may be ignored by the EDA tools. (The examples do not show the word Format).
- |* 3) Certain reserved parameter names allow only certain <data_format> selections, as described below.
- |* 4) The <data_format> selection of Value and Default are always mutually exclusive. Certain parameters may require Value or Default, but Value and Default are not allowed to be present together for the same parameter.
- |* 5) <data_format> is always required for selections other than Value.
- |* 6) Default is optional for <data_format> Range, List, Corner, Increment and Steps.
- |***** 7) Default is not allowed for Usage Out parameters
- |***** 8) Default is not allowed for <data_format> Table, Gaussian, Dual-Dirac and DjRj.
- |** 9) Additional rules apply when <data_format> is Table. The format for <data> describes a set of rows containing data values. Each row has its set of column data values enclosed by parentheses '(' and ')'. Each row contains the same number of column values. Any or all of these columns may have different data types. For this case the <data_type> argument is either a list of data types (one for each column), or a single data type. If it is a single data type then this type shall be applied to all of the columns in each row.
- |*** 10) Description is optional.
- |*
- |*
- |***** For Usage Out parameters, ({Format} <data_format> <data>) may be ignored by the EDA tool, except when <data_format> is Table where a one-row Table is required in <data> to serve as a template for single and multi-row tables.

ANALYSIS PATH/DATA THAT LED TO SPECIFICATION

The author of this BIRD posted an email on the IBIS ATM email reflector (ibis-macro@freelists.org) on December 12, 2011 with questions and suggestions on these problems. This email resulted in a very active email exchange between December 12 and 19, 2011, involving private and public messages. This email thread revealed that various experts in this field have a wide range of interpretation on this topic. The topic was also discussed at length in the December 20, 2011 ATM meeting, where the following slides were used for the discussion:

http://www.vhdl.org/pub/ibis/macromodel_wip/archive/20111220/arpadmuranyi/Notes%20on%20Usage%20Out%20parameters%20in%20IBIS-AMI/UsageOutFixNotes_2011_12_20.pdf

Most of the questions were answered by Walter Katz (SiSoft), stating what the original intent of the IBIS-AMI specification was. However, the meeting ended inconclusively on some points. This BIRD attempts to correct the wording of the specification to reflect the original intent as described in the December 20, 2011 ATM teleconference without putting road blocks in front of some of the suggested additional capabilities for the future.

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ANY OTHER BACKGROUND INFORMATION:
