AMuZed User Manual

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AMuZed is a graphical editing tool for the creation of μ-charts

Chapter 1

Getting Started

1.1 Menus and Tools

Upon opening the AMuZed application, the first thing you will see is the tool palette. This is made up of a File menu (denoted by the word File) and ten editing tools represented by icons.

Clicking on the File menu invokes a drop down menu containing four items. Each menu item also has a keyboard shortcut associated with it.

Open *(Ctrl o)*	Use this menu option to open an existing chart (.muz file)
Check Syntax*(Ctrl m)*	Use this menu option to parse the transition commands and produce a table of signals and variables used in your chart
Save As*(Ctrl s)*	Use this menu option to save the current chart to a new file
Quit*(Ctrl q)*	Use this option to quit out of the application

The icons on the tool palette are as follows (from left to right, top to bottom)

New	Creates a new chart
Open	Opens an existing chart (.muz file) (Same function as Open on File menu)
Compose	Adds a composition to your chart
Decompose	Decomposes a state in your chart. (Note: acts on the currently selected state)
Feedback	Adds feedback to your chart
State	Adds a state to your chart
Transition	Adds a transition between states
Save	Saves your chart
Print	Saves your chart to a printable .eps file (Note: only the currently selected chart)
LocalVariable	Adds a local variable to the chart

1.2 Creating A New Chart

To create a new chart in AMuZed you should first click on the 'New' button in the toolbar. This will invoke a dialog box where you can enter the name you wish to give to your chart. (Note: there are some restrictions on the syntax you can use for chart names, these are detailed later in this document.) Once you have entered the name in the dialog box click on the 'OK' button. (You can cancel chart creation at this point by clicking on the 'Cancel' button instead.) If you have clicked 'OK' another dialog box will appear, this time requesting the name you wish to give to the default state. (Note: there are some restrictions on the syntax you can use for state names, this is detailed later in this document.) Enter the name you want to give to your default state and click 'OK' (clicking on the 'Cancel' button will cancel creation of the chart.) A blank window will appear. If you move your mouse cursor within the window area you will see a greyed-out oval which moves with the cursor. This is the object which will represent your default state. Click anywhere in the window to place the object (you can move it at any time later by dragging it within the window.) You have now created your chart, in the middle of the state object will be the state name, and just above and to the left of the state object is the chart name. The double lines around the state oval indicate that this is the default state (further states added to the chart will just have a single line.)

The red outline around the chart box indicates that this is the currently selected chart. Similarly the blue outline around the state object indicates that this is the currently selected state. As you add more states and compositions to your chart you can change which is the currently selected item (or active item) by clicking on it.

1.3 Adding Items To Your Chart

You can now develop your chart by adding additional items to it.

Add a new state
Click on the State button in the toolbar. A dialog box will appear prompting you for a name for this new state. (Note: you cannot use the same name as any previous states already added or any chartnames already used.) Once you have entered the name you wish to use click 'OK' (clicking 'Cancel' will cancel the addition of a state.) As in the addition of the default state, a greyed-out oval will be visible within the chart window and will move with your mouse cursor until you click in the chart to place this object.

Add a transition
Click on the transition button in the toolbar. A dialog box will appear with two lists of states, one for the state the transition will start at, the other for the state the transition will end at (both lists include all states in the currently active chart.) In the 'From' list click on the state where the transition will start, then in the 'To' list click on the state where the transition will end (the selected states will be highlighted,) then click 'OK' (clicking on 'Cancel' will cancel creation of the transition.) Another dialog box will appear this time prompting for a transition command, enter the command you wish to use. (Note: there are some restrictions on the syntax you can use for transition commands, these are detailed later in this document.) Then click 'OK'. An arrow will appear between the states you have chosen with a label showing the command.

Decompose a state
Click on the state you wish to decompose to make it active (so that it has a blue border) and then either click on the 'Decompose' tool on the toolbar, or choose 'Decompose' from the rightclick menu (detailed later in this document.) A dialog box will appear prompting you for a default state name for the new chart. (Note: you will not be prompted for a chart name, this will be automatically set to the same name as the state you are decomposing.) Enter the name you wish to use and click 'OK' (clicking 'Cancel' will cancel the decomposition of the state.) A new window will appear with a greyed-out oval representing the default state which can be positioned by clicking anywhere in the new window. The new decomposition chart is now created and you can add items to it or edit it in the same way as your master chart.

Add composition
Click into the chart you wish to add to, to ensure it is the currently active chart (*i.e.* it has a red border) and then click on the 'Compose' button on the toolbar. A dialog box will appear prompting you to enter a chart name. Once you have entered the name you wish to use, click 'OK' (clicking on 'Cancel' will cancel creation of the new chart.) Another dialog box will appear prompting for the name of the default state. Enter the name you wish to use and click

‘OK’ (clicking on ‘Cancel’ will cancel creation of the new chart.) A greyed-out state object will appear in the chart window and you can place it by clicking anywhere in the window. (Note: the object may not appear where you have placed it. Compositions appear below the previous chart and the object will be placed to conform with this — similarly, although you can move this new state by dragging it around the window it will always snap back to a ‘legal’ position in the window.) The new chart is now created and you can add items to it or edit it in the same way as your master chart.

Add feedback
Click into the chart you wish to add feedback to, to ensure it is the currently active chart (*i.e.* it has a red border) and then click on the ‘Feedback’ button in the toolbar. A dialog box will appear prompting you to enter the feedback signals you wish to add to the chart. Enter the signals you wish to add. (Note: there are some restrictions on the syntax you can use for feedback signals, these are detailed later in this document.) Then click ‘OK’ (clicking ‘Cancel’ will cancel addition of feedback.) A small rectangle containing the feedback will appear at the bottom of the chart.

Add local variable
Click on the Local Variable button in the toolbar. A dialog box will appear prompting you to enter the details for the variable. Enter the variable name and value as Variable=Value (Note: you must assign a value to the variable when you declare it). Click ’OK’, (clicking on ’Cancel’ will cancel creation of the local variable) the local variable will appear in the top right hand corner of the chart. You can declare multiple variables at the same time by using a comma to separate your declarations.

Chapter 2

Using The Application

2.1 Processing Your Chart

Once you have created your chart there are a number of things you can do with it :

save it
print it
close it
re-open it

Save
Click on the 'Save' button on the toolbar. A window will appear which will allow you to navigate through your filesystem, if necessary, to control where the chart is saved. At the bottom of this navigation window a default file name is provided (ending in .muz) you may however override this and give the file any name you choose. (Note: you must ensure that you keep the .muz extension however, or you will be unable to reopen the file from within AMuZed.) Once you are satisfied with the file name and the location for saving the file, click 'Save' (clicking 'Cancel' will cancel the saving of the chart.)

Print
Printing your chart involves it being saved as a .eps file which you can then print from within your Unix system. First you must click into the chart you wish to print to ensure it is the currently active chart (*i.e.* it has a red border,) then click on the 'Print' button on the toolbar. A window will appear which will allow you to navigate through your filesystem, if necessary, to control where the chart is saved. At the bottom of this navigation window a default file name is provided (ending in .eps,) you may however override this and give the file any name you choose. (Note: you should ensure that you keep the .eps extension however, or may find that you subsequently have problems printing it.) Once

you are satisfied with the file name and the location for saving the file, click 'Save' (clicking 'Cancel' will cancel the creation of the print file.) You can now print the .eps file by either using the relevant print command within Unix or from within a postscript viewing application such as ghostview.

Close
Use the rightclick menu option 'Close'. The close function behaves slightly differently depending on which chart is the currently active chart (*i.e.* is highlighted in red) when you choose this option. If the master chart (*i.e.* the first part of the chart you created) is active, then all chart windows will close. If it is a decomposition chart then only the window for that chart will close. (Note: you can reopen it at any time using the 'Open Decomposition' option from the rightclick menu.)

Re-Open
Click on the 'Open' button on the toolbar or choose 'Open' from the File menu. A window will appear which will allow you to navigate through your filesystem to find the relevant .muz file, or you can type in the full pathname of the file into the FileName space at the bottom of the window. Once you have selected the file (by clicking on its listing in the navigation window) or typed in the relevant pathname, click on 'Open' (clicking on 'Cancel' will cancel the opening of the file) and a new window will appear with the chart shown in it. You can now add to, edit or process this chart in the same way as you would a new chart you have created.

2.2 Editing Your Chart

A number of different editing options are available within AMuZed. These allow you to perform the following functions:

rename a state
delete a state
edit a transition label
delete a transition
move a transition
delete a decomposition
delete part of a composed chart
edit feedback list
delete feedback list
edit a local variable
delete a local variable

The commands for these options can be found in the rightclick menus.

Rightclicking on an atomic state object brings up the following menu items:

Rename	Allows you to edit the name of the state
Delete	Deletes the state (and all associated transitions)
Decompose	Decomposes the state (same function as 'Decompose' on the toolbar)
Close	Closes the current chart window — if this is the window containing the top chart then you will be reminded that any unsaved changes will be lost and given the option of cancelling the command to enable you to save first. If the current chart window is a decomposition chart then only this chart window will be closed
Quit	Quits out of the application (same function as 'Quit' in the File menu)

Rightclicking on a decomposed state object brings up the following menu items:

Open Decomposition	Opens a window containing the decomposition chart (if you have previously closed the window using the close command)
Delete Decomposition	Deletes the decomposition chart and resets the state to an atomic state
Rename	Allows you to edit the name of the state
Close	Same function as detailed for state object menu above
Quit	Quits out of the application (same function as Quit on the File menu)

Rightclicking on a transition signal label brings up the following menu items:

Edit Signal	Allows you to edit the transition label
Move	Allows you to change the states the transition is attached to
Delete	Deletes the transition
Close	Same function as detailed for state object menu above

Rightclicking on a chart name brings up the following menu items:

Delete Chart	Deletes part of a composed chart. (Note: If you have only a single sequential chart you cannot delete this — if you really want to delete your chart totally use the Close option without saving)

Rightclicking on a feedback box brings up the following menu items:

Edit	Allows you to edit the list of feedback signals.
Delete	Deletes the feedback signals.

Rightclicking on a local variable label brings up the following menu items:

Edit	Allows you to edit the variable(s) name(s) and value(s).
Delete	Deletes all variables. (Note: to delete a single local variable when more than one has been declared, used the edit option and remove the one you wish to delete).

2.3 Naming Rules

There are a number of syntax rules which should be observed when naming objects and transition commands within AMuZed, these are designed to assist with the smooth translation of your charts into Z. If you try to use a name which has incorrect syntax you will get a warning. In some cases you may override these warnings — however you should be aware that if you choose to do this you may find that either your chart will not translate correctly into Z or that some of the names you have used are changed after translation by ZooM (names that ZooM considers unsuitable may be replaced with generic names such as Signal1, State1 *etc.*)
Names containing spaces will have the spaces replaced by an underscore in any Z translation performed by ZooM.

Chart names	only alphanumeric characters should be used
State names	only alphanumeric characters should be used. In addition they must contain at least one alpha character and never contain ! (This is is a program restriction and may not be overridden)
Feedback signals	only alphanumeric characters should be used. The list may be enclosed in {} and separated by commas or may be just a comma separated list, in which case the {}will be added automatically.

You should also note that you cannot duplicate chart names and state names. (Note: When you decompose a state, the decomposition chart takes the same name as the state by default, however if you rename the state the chart name will not be affected.)

2.4 Transition Commands

Transition commands are comprised of two parts, an input guard which acts as a test to see whether or not a transition should take place, and an output action which occurs when the transition takes place. The input guard and output action should be separated with a /. If you have a transition with no output guard you can omit the / after the input guard or retain it, as you choose. (Note: If you wish to have a transition with no input guard and no output action you should use just a / to indicate this.)

Input guards may contain the following :
Signals
Signal tests (for value carrying signals)
Variable tests
These can be combined using logical operators . for AND, + for OR and can also be negated using -.

Output actions may contain the following :
Signals
Signals with values
Variable assignments
Signals should be enclosed in and be the first thing listed after the /.
Once all signals have been listed any signal or variable assignments are listed using := as the assignment operator rather than =. If there are multiple assignments they can be comma separated.

Some examples of valid transition commands are as follows :

insig/outsig	single input signal guard and single output signal
insig/{a,b,c}	single input signal guard and multiple output signals
insig=4/{a}	input signal test guard and single output signal
lvar=insig/lvar:=44	input signal,variable test guard and variable assignment action
a/{a}lv:=2,outs:=33	single input signal guard and multiple output signals, variable assignment and value carrying signal output.

2.5 Signals and Variables Table

Selecting the 'Check Syntax' option from the File menu (or using the keyboard shortcut Ctrl-m) causes two things to occur. Firstly all the transition commands are parsed, then a table is presented which gives information about the signals and variables used in the chart and information about any commands that were not parsed correctly along with suggestions of how to fix them.

The table contains the following headings and information :

Name	The name of the item being described
Type	var if the item is a variable, sig if it is a signal
Val Type	The type of the values for the item, for a variable this may be Int (if all of its assigned values are numeric) or Free. Signals may also have the Val Type NonVCS, this means that they are signals that do not carry any value.
Chart Name	The name of the sequential chart the item is in. (Note: if a signal appears in more than one chart it is listed multiple times – URGH!!)
Free Values	A list of all non numeric values assigned to the item

Matched With	A list of all other items this items is compared with or assigned against.

If all transition commands were successfully parsed the table contains the line 'No errors found during parsing', otherwise a list of problem transition commands is given along with suggestions as to the possible problem and how to fix it.

2.6 Common Problems

There are some common errors which you may come across when you first use the AMuZed application. These are detailed below along with the relevant solution :

Problem:	When I try to print my chart nothing comes out of the printer.
Solution:	The print function saves the selected chart to a printable .eps file. You will then need to print this file (using the Unix lpr command or from within an application such as ghostview.)

Problem:	When I print my chart I only get the top chart and not the decompositions.
Solution:	The print function only saves the currently selected chart to a .eps file. Choose each chart in turn and click on the print button.

Problem:	I want to delete one of my decomposition charts, but when I select 'Delete Chart' from the menu I get a dialog message saying "You cannot delete this chart".
Solution:	You can only use the 'Delete Chart' function on parts of a composed chart. If you want to delete a decomposition chart use 'Delete Decomposition' on the decomposed state instead.